

## An expanded circumscription and new infrageneric classification of *Rinzia* (Myrtaceae: Chamelaucieae)

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### Abstract

Rye, B.L. An expanded circumscription and new infrageneric classification of *Rinzia* (Myrtaceae: Chamelaucieae). *Nuytsia* 28: 39–93 (2017). The circumscription of *Rinzia* Schauer (Myrtaceae tribe Chamelaucieae DC.) is enlarged to encompass species with varied stamen arrangement, filament width and seed morphology. This revision of *Rinzia s. lat.* is based on both morphological and molecular evidence, and establishes five sections within the genus, *Discolora* Rye, *Mesostemon* Rye, *Polyandra* Rye, *Semasperma* Rye and the typical section. All sections occur in Western Australia, with three of them endemic to the south-west, while sect. *Polyandra* also occurs in central Australia and sect. *Semasperma* also occurs in south-eastern Australia. Three new combinations are made for species previously included within *Baeckea* L., and the new name *R. orientalis* Rye is published for *B. crassifolia* Lindl. *Baeckea crassifolia* var. *icosandra* F.Muell. ex Benth. is raised to species rank as *R. icosandra* (F.Muell. ex Benth.) Rye. The other new combinations are *R. ericaea* (F.Muell. ex Benth.) Rye and *R. polystemonea* (F.Muell.) Rye. Four new Western Australian species are described as *R. fimbriolata* Rye & Trudgen, *R. medifila* Rye, *R. torquata* Rye & Trudgen and *R. triplex* Rye & Trudgen, and a new subspecies from Kangaroo Island, South Australia, as *R. ericaea* subsp. *insularis* Rye. *Rinzia morrisonii* Trudgen is reduced to synonymy under *R. longifolia* Turcz. Lectotypes are selected for *Baeckea ericaea* F.Muell. ex Benth. and *R. morrisonii*. Seven Western Australian species have conservation priority.

### Introduction

*Rinzia* Schauer is a reniform-seeded genus of Myrtaceae tribe Chamelaucieae DC. that was reinstated by Trudgen (1986a). Trudgen's delimitation of the genus is not supported by recent molecular studies (e.g. Wilson *et al.* 2004), which have indicated that a wider circumscription is necessary for *Rinzia* to be monophyletic. *Rinzia s. lat.* is readily diagnosed on morphological grounds although it is considerably more variable than any of the five other reniform-seeded genera, *Astus* Trudgen & Rye (Trudgen & Rye 2005), *Enekbatus* Trudgen & Rye (Trudgen & Rye 2010), *Euryomyrtus* Schauer (Trudgen 2001), *Ochrosperma* Trudgen (Trudgen 1987; Bean 1995b, 1997) and *Triplarina* Raf. (Bean 1995a). The greater degree of morphological variation found in the enlarged genus warrants recognition of a number of sections. *Rinzia s. lat.* is revised here and divided into five sections based on a combination of morphological and molecular evidence.

### Taxonomic history (1838–2001)

Early botanists relied on stamen morphology to distinguish *Rinzia s. str.* from other species groups. The first member of *Rinzia s. lat.* to be described, an eastern species with narrow filaments, was initially named *Baeckea crassifolia* Lindl. (in Mitchell 1838). That species was not included when Schauer (1843, 1844) established the genus based on a western species with very broad filaments, *R. fumana* Schauer.

Four more species with broad filaments were named by Lehmann (1848) and Turczaninow (1852) as *B. schollerifolia* Lehm., *R. crassifolia* Turcz., *R. longifolia* Turcz. and *R. oxycoccoides* Turcz. These were followed by the description of two taxa with narrow filaments by Mueller (1858, 1861) as *B. microphylla* var. *ericaea* F.Muell. and *B. polystemonea* F.Muell.

Bentham reduced *Rinzia* to a section of a broadly circumscribed *Baeckea* L. (in Bentham & Hooker 1865), then described *B. dimorphandra* F.Muell ex Benth., which has broad filaments, and *B. crassifolia* var. *icosandra* F.Muell. ex Benth., which has narrow filaments (Bentham 1867). He placed all of the species with broad filaments in *B. sect. Rinzia* (Schauer) Benth. & Hook.f. and those with narrow filaments in *B. sect. Euryomyrtus* (Schauer) Benth. Members of *Rinzia s. lat.* made up the bulk of both sections, with sect. *Euryomyrtus* having only one species now considered to belong in the genus *Euryomyrtus* (and one now placed in *Astus*), while sect. *Rinzia* included one species now placed in *Cyathostemon* Turcz.

Nieden zu (1893) transferred all members of Bentham's sect. *Rinzia* to *Hypocalymma* (Endl.) Endl., which he regarded as differing from *Baeckea* in a number of characteristics of the stamens and style, including the stamens being more erect in bud and more or less united at the base, the anther basifixed and the stigma small. He included the *Rinzia* species under *H. sect. Cardiomyrtus* Schauer, defining this section as having a 3-locular ovary with 2–12 ovules in each loculus and an inset style. However, Bentham's earlier treatment of *Rinzia* as a section of *Baeckea* was followed by most subsequent authors.

A species with stamens of intermediate width was described by Moore (1920) as *B. carnososa* S.Moore. While relatively narrow, the filaments in this species are nevertheless flattened, better matching those of species in *Baeckea* sect. *Rinzia* than *B. sect. Euryomyrtus*, but differing from the former in having versatile anthers.

Trudgen (1986a) reinstated *Rinzia*, treating it as a genus endemic to the south-west of Western Australia and naming a number of new species that have broad filaments. He transferred *B. carnososa*, the species with moderately broad filaments, to *Rinzia*, and suggested that its dorsifixed anthers 'may indicate that the adaxial attachment of anthers in *Rinzia* developed within the genus' (Trudgen 1986a: 427). He regarded *Hypocalymma* as a close relative of *Rinzia* but pointed out that the dorsifixed anthers of *Rinzia* were usually attached on the inner surface of a highly compressed filament, while those of *Hypocalymma* were clearly basifixed, as previously indicated (see above) by Nieden zu (1893).

Trudgen (1986a, 2001) included *Rinzia* in a 'reniform-seeded lineage', in which he mistakenly also included *Balaustion* Hook. and *Hypocalymma* (see Rye & Trudgen 2008; Rye 2009a; Rye *et al.* 2013). However, even after removal of those two genera, the reniform-seeded lineage is not supported as a clade in molecular analyses (e.g. Lam *et al.* 2002).

## Current morphological studies

The current study of *Rinzia*, part of a broader assessment of the tribe Chamelaucieae, began in 2002 and led to the application of manuscript names to several species groups that are here included within *Rinzia*. Trudgen (2001; pers. comm.) had recognised at least three very small species groups within his reniform-seeded lineage that he considered represented new genera, and I established one further group that included *R. carnos*a (S.Moore) Trudgen:

1. ‘*Aethestemon*’ ms, comprising two taxa with multiple staminodes, *Baeckea* sp. Merredin (K.R. Newbey 2506) and *B.* sp. Parker Range (M. Hislop 2968 & F. Hort).
2. ‘*Xeromesos*’ ms, comprising *B. polystemonea* alone, a species similar to ‘*Aethestemon*’ but lacking staminodes.
3. ‘*Semasperma*’ ms, comprising *B. crassifolia*, *B. crassifolia* var. *icosandra* and *B. ericaea*, all of which have seeds with a large, divided cavity on the inner surface. My circumscription of this informal group is given here; Trudgen regarded *B. ericaea* as an additional monotypic genus called ‘*Amischos*’ ms.
4. ‘*Latistemon*’ ms, comprising *R. carnos*a, *B.* sp. Bullfinch (K.R. Newbey 5838) and *Euryomyrtus* sp. Parker Range (N. Gibson & M. Lyons 2269).

‘*Aethestemon*’, ‘*Latistemon*’, ‘*Semasperma*’ and ‘*Xeromesos*’ were included, as unpublished species groups of unspecified authorship and rank, in the key to genera and sections of Western Australian Myrtaceae in Rye (2009b).

## Molecular studies

Lam *et al.* (2002) included two south-eastern Australian and three Western Australian species of *Rinzia s. lat.* in a phylogenetic study of Chamelaucieae based on the chloroplast regions *atpB-rbcL* spacer and *matK*. These formed a weakly supported clade. The western species *R. icosandra* (F.Muell. ex Benth.) Rye [as *B. crassifolia* var. *icosandra*] of ‘*Semasperma*’ received somewhat greater, but still weak, support as more closely related to *Rinzia s. str.* (two species including the type) than to the south-eastern Australian species *R. ericaea* (F.Muell. ex Benth.) Rye [as *B. ericaea*] and *R. orientalis* Rye [as *B. crassifolia* var. *crassifolia*], although on morphological grounds it appears to be much closer to the latter pair of species.

Wilson *et al.* (2004), in an extended phylogenetic analysis of the Chamelaucieae, sampled ten species of *Rinzia s. lat.*, including representatives of all species groups except ‘*Aethestemon*’, and used additional chloroplast regions (5' *trnK* and *ndhF*). All ten taxa formed a single clade without any extraneous species, although again with relatively weak support. *Rinzia s. str.* was not supported as monophyletic within this clade.

Later studies based on the nrDNA ETS marker (Peter Wilson pers. comm.; Rye *et al.* in prep.) place species sampled from all of the sections treated here in a clade comprising *Rinzia s. lat.*, with *Enekbatus* weakly supported as sister. Within the clade, the nuclear and chloroplast markers produce different topologies, with the nuclear data indicating that ‘*Semasperma*’, as recognised based on morphological criteria, may be tenable (the western species recognised here as *R. icosandra* has weak to moderate

support in a sister position to a strongly supported clade comprising the two eastern Australian ‘*Semasperma*’ species). All three species are included in sect. *Semasperma* Rye here. The two species of ‘*Aethestemon*’ form a strongly supported group, which is well supported as sister to ‘*Xeromesos*’ in both ETS and chloroplast analyses. Since morphological data also support this relationship, the two species groups are combined here as sect. *Polyandra* Rye. ‘*Latistemon*’, treated here as sect. *Mesostemon* Rye, is strongly supported in all data. One additional group indicated in the chloroplast and ETS data is treated here as sect. *Discolora* Rye.

## Methods

As all species of sections *Discolora* and *Rinzia* have already been revised in Trudgen (1986a), they are given only brief descriptions. Any significant differences from the previously published descriptions are noted, and a number of previously unrecorded characters are scored, notably petal length, style length, seed width and thickness, and aril length. Cited specimens are selected mainly from among the more recently collected material; any specimens correctly cited previously in Trudgen (1986a) are excluded.

Full descriptions are given for all members of the other three sections. All descriptions are based on new measurements taken from dried, adequately pressed material.

Images of overseas and interstate types were examined through *Global Plants* (<http://plants.jstor.org/>). Distribution data were obtained from PERTH specimens, loan specimens from AD, ADW, BRI, CANB, CBG, DNA, MEL, NSW and NT, and additional data sourced from *FloraNT* (Northern Territory Herbarium 2015–) for *R. polystemonea*.

## Morphology

Morphological differences between the sections of *Rinzia* are summarised in Table 1, and many of the characters found in the genus are illustrated in Figure 1.

*Habit and vegetative morphology.* Members of sections *Discolora*, *Rinzia* and *Semasperma* are prostrate or low shrubs, and some produce facultative adventitious roots. The tallest species belong to sect. *Polyandra*, for which the maximum recorded height is 2.5 m. Leaves in sect. *Discolora* are discolorous and have slightly to markedly recurved margins, whereas species in all other sections have concolorous leaves, which are either thicker or have level margins. Leaves in sect. *Polyandra* have crowded oil glands, while those in other sections usually have fewer, sparser glands.

*Inflorescence.* Flowers are usually solitary on each peduncle except in *R. affinis* Trudgen and *R. dimorphandra* (F. Muell. ex Benth.) Trudgen, which have two flowers on most peduncles. Occasional 2-flowered peduncles have also been recorded in *R. crassifolia*. All three species belong to sect. *Rinzia*.

*Calyx and corolla.* All taxa have predominantly pentamerous, white to bright pink flowers. The sepals are much shorter than the petals, with the herbaceous midrib smooth to ridged but not horned, usually with a pale margin (see Figure 1B) surrounding a more herbaceous part that is often deep pink-purple to reddish. The petals are contracted at the base (see Figure 1C); they are deciduous in fruit in most taxa, but seem to persist to some degree in *R. ericaea* and *R. polystemonea*.

*Stamen number and arrangement.* Several inter-related kinds of stamen arrangement are evident within *Rinzia*. In all species one stamen is directly opposite each petal, with the minimum stamen

**Table 1.** Comparison of the sections of *Rinzia*.

Section	<i>Discolora</i>	<i>Mesostemon</i>	<i>Polyandra</i>	<i>Rinzia</i>	<i>Semasperma</i>
<b>Maximum height</b>	0.2 m	1.3 m	2.5 m	1 m	1.3 m
<b>Adventitious roots</b>	often present	absent	absent	sometimes present	sometimes present
<b>Leaves</b>	discolorous	concolorous	concolorous	concolorous	concolorous
<b>Pedicle length</b>	(4–)7–35 mm	0.8–3 mm	1–6 mm	0.8–6.5 mm	0–5 mm
<b>Stamens &amp; staminodes</b>	(5–)10	10	15–30(–36)	(5–)10	5–20
<b>Filament width</b>	broad	medium	narrow	broad	narrow
<b>Anthers</b>	adnate to filament	versatile	versatile	adnate to filament	versatile
<b>Stigma</b>	capitate	capitate	peltate	capitate	capitate or peltate
<b>Ovule number</b>	4–12	3–6	2–5	2–9	2
<b>Fruits</b>	pendulous	erect	erect	pendulous	erect or pendulous
<b>Fertile placentas</b>	brown with paler small markings	brown with paler small markings	blackish with broad white patches	brown with paler small markings	brown with pale linear markings
<b>Seed length</b>	1.3–1.8 mm	1.3–1.5 mm	1.6–2.1 mm	1.3–1.9 mm	1.1–1.6 mm
<b>Seed outer surface</b>	smooth to deeply colliculate	finely colliculate	tuberculate	smooth to ± tuberculate	finely colliculate
<b>Seed inner surface</b>	with a large aril	unmarked except for small hilum	with a circle or a longitudinal ridge	usually with a large aril	with longitudinal divisions
<b>Aril</b>	present	absent	absent	usually present	absent

number therefore being five. Most commonly, there are ten stamens, five antipetalous and five smaller antisepalous ones. This regular arrangement occurs in all species of sect. *Mesostemon* and in most species of sections *Discolora* and *Rinzia*; however two species from the latter sections, *R. fumana* and *R. schollerifolia* (Lehm.) Trudgen, have stamen numbers varying from five to ten.

In the second most common stamen arrangement, triads of stamens are antipetalous, with one large stamen in the middle and two smaller ones on either side of each triad, with or without smaller, antisepalous stamens or staminodes. This pattern characterises sect. *Polyandra* and occurs in some species in sect. *Semasperma*. In sect. *Polyandra*, *R. polystemonea* (F.Muell.) Rye has been recorded with up to 24 stamens, while *R. torquata* Rye & Trudgen has up to 21 staminodes in addition to 15 stamens, giving a total of up to 36 members in the androecium (Figure 1C–E). In *R. ericaea* (sect. *Semasperma*) only 15 stamens are present and there are distinct gaps between the triads; individual stamens within the triads in this species are rarely slightly united into bundles. This pronounced pattern of antipetalous triads, with no antisepalous stamens, is not known in any other Chamelaucieae, although some members of the subtribe Chamelauciinae (DC. ex F.Rudolphi) Arn. have antipetalous triads alternating with solitary antisepalous stamens, making a total of 20 stamens.

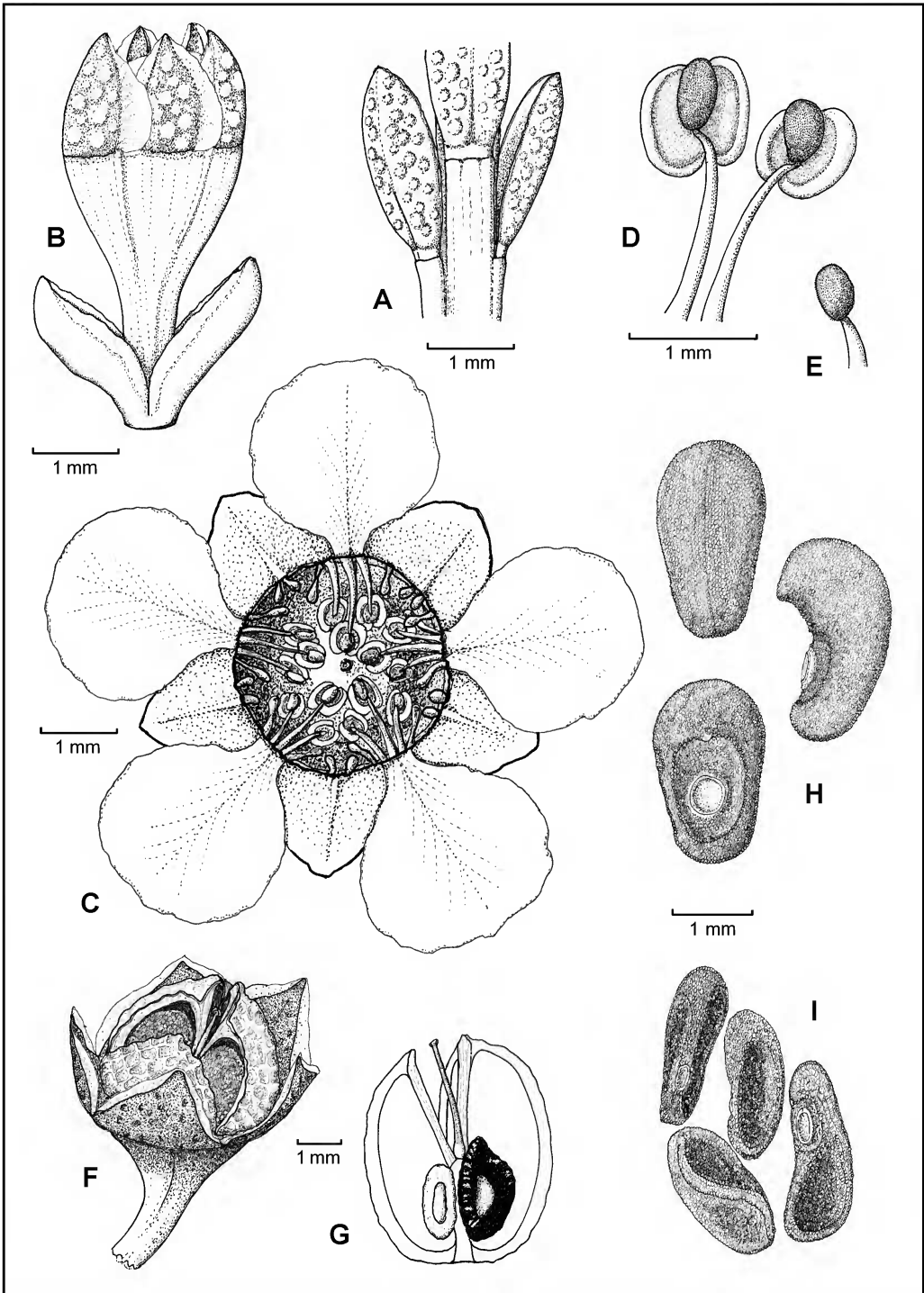


Figure 1. *Rinizia torquata*. A – opposite leaves; B – peduncle, bracteoles, pedicel and flower bud; C – top view of flower; D – stamens; E – staminode; F – fruit; G – LS of fruit showing seed-bearing placenta (on right) and immature or sterile placenta (on left); H – inner, outer and side views of seed; I – chaff pieces. Drawn by L. Cobb from *M. Barrow* 160 (A–E), *J.M. Flint* 33B (F–I).

Two members of sect. *Semasperma*, *R. orientalis* and *R. icosandra*, are very variable in stamen number and could be regarded as bridging the gap between the two main kinds of stamen arrangements described above. Specimens of these two taxa have stamen numbers ranging from five, all antipetalous, to 20. Each adjacent pair of large antipetalous stamens is separated by 0–3 smaller, usually equidistant stamens. Where a full 20 stamens occur in a flower, there is a regular arrangement with ten of them directly opposite a sepal or petal and ten in the gaps between them, i.e. occurring both opposite and alternating with the petals and sepals.

*Filaments.* In sections *Discolora* and *Rinzia* the antipetalous and antisepalous stamens are dorsiventrally compressed and commonly laterally fused (as in *R. sessilis* Trudgen; see Trudgen 1986a: Figure 1), with the width of the androecial tube thus formed contracting towards the top where it surrounds the stigma. This is very similar to the shape of the androecium in *Cyathostemon* species, which show a similar concentration of species towards the south coast of Western Australia, suggesting that the two genera have the same pollination syndrome. The other sections usually have all filaments free and not so crowded around the stigma.

*Anthers.* *Rinzia* includes species with the primitive myrtaceous anther morphology, as found in the great majority of genera in the family as a whole. The anther is broad, dorsifixed and versatile, with parallel, longitudinally dehiscent thecae and a free, subterminal, dorsal connective gland (Figure 1D). However, all species in sections *Discolora* and *Rinzia* have non-versatile anthers inserted on the inner surface of a broad filament that usually extends distinctly above the top of the anther loculi.

*Staminodes.* Staminodes occur consistently in two members of sect. *Polyandra*. As illustrated in Figure 1E, the staminodes have a normal-sized, functional connective gland but the thecae are usually completely absent. Staminodes occur regularly in a number of other genera of Chamelaucieae, and in some cases are quite elaborate, but those in sect. *Polyandra* are unique in retaining a bare connective gland.

*Ovary.* The ovary is 3-locular and has two to 12 reniform ovules in each loculus. Where there are only two ovules, their arrangement is collateral. Where there are three to five ovules, the ovule attachment points are arranged in an arch, with no attachments across the base of the placenta but with one directly at the summit of the placenta if the ovule number is uneven. If the ovules are more numerous, they may appear to be in two rows rather than forming an arch, although there are still no attachments across the base of the placenta.

*Style.* The base of the style is immersed within a cylindrical depression in the summit of the ovary and extends down to the level of attachment of the placentas (see Figure 1F, G). The stigma varies from small and capitate to flattened and peltate; when peltate it is up to about 0.3 mm in diameter. Style length, a character that was not recorded in the revision of *Rinzia s. str.* (Trudgen 1986a), is much less variable than in other genera of a similar size in the tribe, although it is used twice in the key to the species below. This contrasts with the extremely variable between-species variation in style length in many other genera of Chamelaucieae (it is the single most useful character in distinguishing species within the tribe), and suggests that species in *Rinzia s. lat.* show little variation in their pollination strategy.

*Fruits.* All species have a 3-valved capsule (Figure 1F) that varies from 1/2-inferior to about 3/4-superior, with some of the superior part of the fruit closely surrounded by the free part of the hypanthium. Capsules are described as ‘pendent’ in *Rinzia s. str.* (Trudgen 1986a: 421). The valves usually open very widely, to well beyond the erect position. Fruiting placentas vary in size, shape and colouring

between the sections, and the seeds also show significant differences (see below). In sect. *Polyandra*, seed-bearing placentas are very dark red-brown, appearing virtually black (Figure 1G), contrasting with the white attachment points of the seeds. Immature or infertile placentas (Figure 1G) are smaller, and white to pale brown. Other sections have less obvious, usually brown placentas.

*Seeds and chaff.* All species have more or less kidney-shaped seeds (see Figure 1H), a three-dimensional shape referred to here as reniform, although the more common botanical usage of this term is for the two dimensional shape that is kidney-shaped in profile. It appears that ant-dispersal of the seeds is favoured in sections *Discolora* and *Rinzia* since almost all species have an obvious free aril surrounding the hilum (see Trudgen 1986a: Figure 2). Seeds of sect. *Semasperma* have a large cavity with two stiff divisions, while those of two species of sect. *Polyandra* have a large, circular hilum (Figure 1H). Among species that have only two ovules in each loculus, the maximum possible seed set of six seeds per fruit is sometimes achieved. Chaff pieces (unfertilised ovules or early-aborted seeds) may be variable in the same fruit or loculus, some very flattened, others thicker and crumpled (Figure 1I) or more angular than the seeds, often pale brown and crustaceous.

### Taxonomy

*Rinzia* is most likely to be confused with five other genera that have multi-locular fruits with reniform seeds and dorsifixed, longitudinally dehiscent anthers with an obvious, free connective gland. These six reniform-seeded genera are readily distinguished in the key below.

#### Key to reniform-seeded genera

1. Ovary 2–5-locular, sometimes with one loculus sunken below the others or with 2 superposed ovules in each loculus. Fruits fully indehiscent or with 2 upper loculi dehiscent and a somewhat lower loculus indehiscent
  2. Flowers ± sessile. Hypanthium circular in TS. Ovary loculi usually all with 2 ovules. Fruits with all of the 2–5 loculi at the same level, fully indehiscent ..... **ENEKBATUS**
  - 2: Flowers stalked. Hypanthium 5-angled. Ovary loculi with up to 7 ovules, most with more than 2 ovules. Fruits with loculi at 2 overlapping levels, lower level with an indehiscent loculus and upper level with 2 dehiscent loculi..... **ASTUS**
- 1: Ovary 3-locular in all or most flowers, with all loculi at the same level, the ovules collateral, arched or in 2 rows. Fruits with all loculi dehiscent
  3. Stamens antisepalous, with none opposite the centre of a petal (northern and eastern Australia)
  4. Stamens 5–8. Ovules 2 per loculus. Seeds 1–1.5 mm long, with longitudinal dips or furrows separating continuous rows of tubercles, arillate..... **OCHROSPERMA**
  - 4: Stamens 11–18. Ovules 4–14 per loculus. Seeds 0.5–0.8 mm long, uniformly covered by discrete tubercles, without an aril ..... **TRIPLARINA**
- 3: Stamens in varied arrangements, always with antipetalous stamens present (central and southern Australia)
  5. Leaves with parallel venation usually visible on upper surface. Peduncles 0.5–9 mm long, usually about as long as to distinctly longer than the pedicels. Antipetalous colleters forming prominent groups (absent in one eastern species)... **EURYOMYRTUS**
  - 5: Leaf venation obscure or not as above. Peduncles 0–0.6(–1) mm long, usually much shorter than the pedicels. Antipetalous colleters (when present) free, inconspicuous ..... **RINZIA**



**Rinzia** Schauer, *Linnaea* 17: 239–240 (1843); *Baeckea* sect. *Rinzia* (Schauer) Benth. & Hook.f., *Gen. Pl.* 1: 701 (1865). *Type*: *Rinzia fumana* Schauer.

Prostrate to tall *shrubs*, when low-growing sometimes producing adventitious roots, with glabrous stems and flowers. *Leaves* opposite and decussate, glabrous on both surfaces but sometimes with ciliate or lacinate margins. *Peduncles* very short or almost absent, 1-flowered in most species, 2-flowered in a few species. *Bracteoles* persistent in most species, with incurved margins or somewhat folded, sometimes wider from side view than dorsal view. *Pedicels* much longer than peduncles or (in *R. ericaea*) almost absent. *Hypanthium* adnate at base to ovary but free for much of its length, often rugose-pitted. *Sepals* 5, much shorter than petals, erect or slightly spreading, persistent in fruit, with a hyaline or pale margin, the more herbaceous centre tending to be dark pink to reddish. *Petals* widely spreading, broadly obovate to circular, white to bright pink, deciduous in fruit in most species, ± entire. *Antipetalous colleters* few or absent, free, minute and inconspicuous. *Staminodes* absent in most species, when present up to 21, antisepalous, reduced to a stalked connective gland. *Stamens* 5–24, in a single series, connate at the base in many species, antipetalous ones always present but antisepalous ones sometimes absent, incurved. *Antipetalous filaments* larger than filaments in other positions, markedly compressed to ± terete. *Anthers* dorsifixed, either attached at front of a broad filament or versatile, with parallel, longitudinally dehiscent cells; connective gland free, subterminal, globular or ellipsoid. *Ovary* largely superior to largely inferior, 3-locular; summit often becoming deep pink or reddish, dotted with oil glands; ovules 2–12 per loculus, collateral when 2, arched or in 2 rows when more numerous. *Style* slender; base deeply inset into summit of ovary. *Fruits* largely superior (rarely *c.* 1/2-inferior in sect. *Semasperma*), thick-walled, dehiscent by 3 valves, rugose on the hypanthium and/or valves. *Seeds* reniform, often somewhat broader above the middle, 1.1–2.1 mm long, in many taxa with a large whitish aril, in others sometimes with a large inner cavity or large hilum; testa crustaceous, smooth to tuberculate, brown or black, somewhat shiny.

*Size and distribution.* A genus of five sections and 19 species, occurring in central and southern mainland Australia, with the majority of species endemic to the south-west of Western Australia. The distributions of the sections are shown in Figures 2 and 3.

*Etymology.* Named after two horticulturalists of Frankfurt, Sebastian Rinz (1782–1861) and his son Jacob Rinz (1809–1860).

### Key to sections of *Rinzia*

1. Stamens regularly 10 in most species, but down to 5 in two species. Antipetalous filaments flat, 0.25–1 mm wide. Seeds either with a large, free-margined aril or with a colliculate testa, with no large cavity on the inner surface
2. Antipetalous filaments 0.25–0.6 mm wide, attenuate at apex; antisepalous filaments free. Anthers with a narrow dorsal attachment at slender summit of filament. Seeds lacking an aril..... sect. **Mesostemon**
- 2: Antipetalous filaments 0.5–1 mm wide, emarginate, truncate or obtuse; antisepalous filaments (when present) united shortly at base or for half to nearly their full length to the antipetalous filaments. Anthers attached to the inner surface of filament. Seeds with an obvious aril in most species
3. Leaves thin, with margins slightly to prominently recurved, discolorous. Pedicels (4–)7–37 mm long..... sect. **Discolora**
- 3: Leaves thick in most species, if flat then with level margins, concolorous. Pedicels 0.8–4(–6.5) mm long.....sect. **Rinzia**

- 1: Stamens 5–24, of variable number in all species. Antipetalous filaments ± terete (at least in distal half), < 0.25 mm wide. Seeds lacking a free-margined aril, either tuberculate or with a large, partitioned cavity on the inner surface
- 4. Androecium with 5–20 stamens but no regularly occurring staminodes. Ovules 2 per loculus. Seeds 1.1–1.6 mm long, with a large, concave inner cavity that is longitudinally divided into 3 parts; testa colliculate .....sect. **Semasperma**
- 4: Androecium with 16–36 members consisting of triads of stamens opposite the petals and shorter stamens or staminodes opposite the sepals. Ovules 2–5 per loculus. Seeds 1.6–2.1 mm long, without a divided cavity but sometimes with a large, fairly flat hilum on the inner surface; testa tuberculate.....sect. **Polyandra**

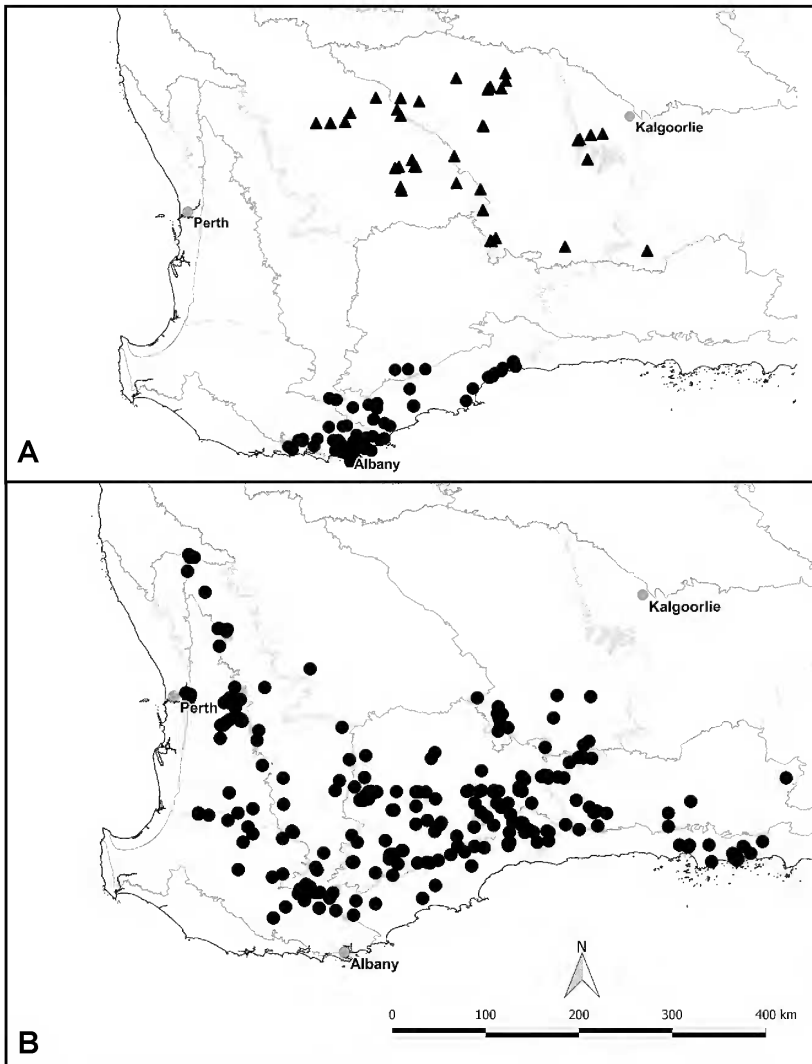


Figure 2. Distributions of the endemic south-western Australian sections of *Rinzia*. A – sect. *Discolora* (●) and sect. *Mesostemon* (▲); B – sect. *Rinzia* (●).

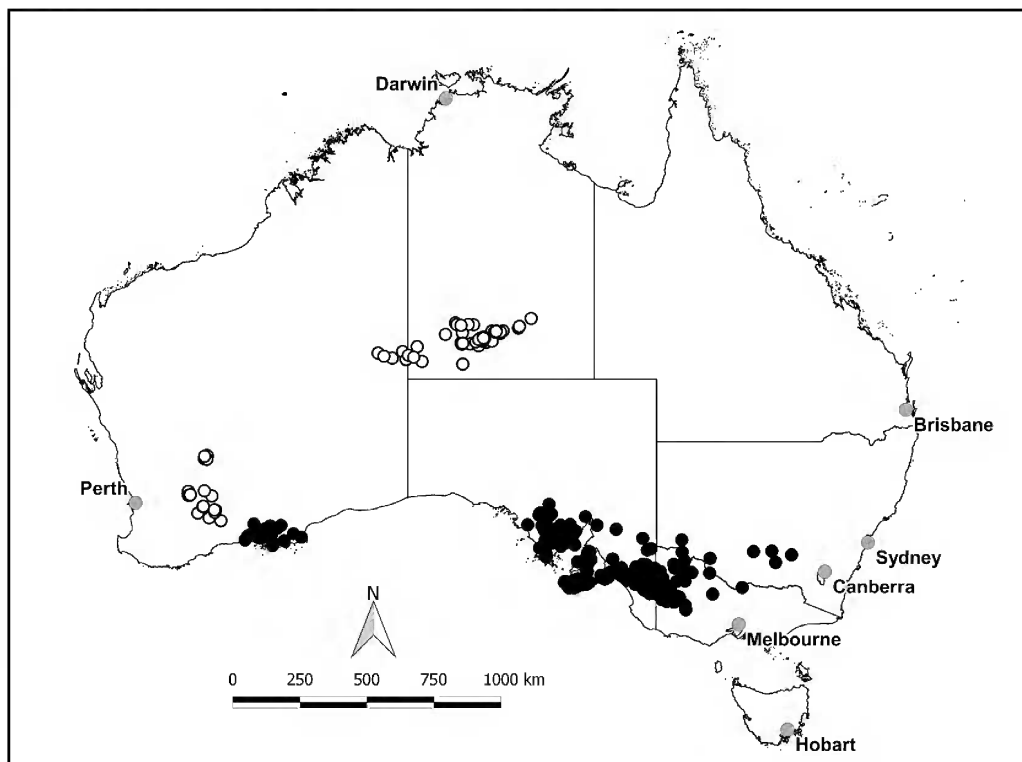


Figure 3. Distributions of sections of *Rinzia* that extend beyond Western Australia, sect. *Polyandra* (○) and sect. *Semasperma* (●).

**Key to species of *Rinzia***

*Note.* Species are listed alphabetically within each section and are numbered consecutively below for the entire genus.

- 1. Ovules 2 per locus
- 2. Filaments ± terete in distal half, < 0.25 mm wide. Seeds with a large, longitudinally partitioned cavity on inner surface, or with a fairly flat hilum and no aril
- 3. Stamines 10–21. Seeds 1.6–1.8 mm long, tuberculate; inner surface with a large, flat hilum and no partitions (Merredin–Hatter Hill, WA)..... **8. *R. torquata***
- 3: Stamines absent or few. Seeds 1.1–1.5(–1.6) mm long, colliculate; inner surface with a large cavity that is longitudinally divided into 3 parts
- 4. Flowers ± sessile within persistent bracteoles. Sepals usually with an obvious pale midrib. Stamens 15, in discrete groups of 3 opposite the petals (Kangaroo Island, SA–Big & Little Deserts, Vic.) ..... **17. *R. ericaea***
- 4: Flowers on a pedicel 0.8–5 mm long, the bracteoles caducous or deciduous. Sepals not obviously ribbed or outer ones with a dark keel. Stamens 5–20, ± equidistant, usually not all in groups of 3 opposite the petals
- 5. Pedicels 0.8–1.5 mm long. Sepals very dark-coloured, darker than hypanthium. Stamens 5–13 (Eyre Peninsula & Kangaroo Island, SA–lower Darling & Murrumbidgee Rivers area, NSW–Ballarat area, Vic.) ..... **19. *R. orientalis***

- 5: Pedicels 1.3–5 mm long. Sepals not much darker than the hypanthium. Stamens (11–)13–20 (Lort River area–Israelite Bay, WA)..... **18. R. icosandra**
- 2: Filaments of antipetalous stamens flat throughout, (0.3–)0.5–1 mm wide. Seeds with no large cavity, arillate
- 6: Leaves sessile, sometimes sparsely ciliolate to densely ciliate (N of Mt Holland–near Pyramid Lake–Poinier Rock, WA)..... **16. R. sessilis**
- 6: Leaves with a petiole 0.2–0.5 mm long, glabrous
- 7: Leaves often 4-ranked, very thick. Antipetalous filaments not or scarcely 2-horned at summit, with papillae inconspicuously coloured and extending down but becoming sparser below summit of filament, i.e. not forming a definite terminal band (Frank Hann NP–Gnowangerup–Young River area, WA)..... **11. R. communis**
- 7: Leaves not regularly 4-ranked, usually distinctly broader than thick. Antipetalous filaments often distinctly 2-horned at summit, terminating in a white band of papillae
- 8: Flowers 6–8 mm diam. Stamens 5–10, variable between flowers rather than uniformly 10. Mature style 0.7–1.1 mm long. Seeds 1.3–1.5 mm long, smooth or colliculate, with a slight beak adjacent to each end of the aril (Brookton Hwy–Collie–Kalgan River area, WA)..... **14. R. fumana**
- 8: Flowers 7.5–13 mm diam. Stamens 10 in all or nearly all flowers. Mature style 1.1–1.6 mm long. Seeds 1.5–1.9 mm long, deeply colliculate to tuberculate, not beaked or rarely beaked at one end only (Watheroo–near Perth–Brookton, WA)..... **12. R. crassifolia**
- 1: Ovules 3–12 in all or most loculi
- 9: Stamens 15–24, with staminodes (when present) increasing the total number of elements to a maximum of c. 35. Filaments ± terete
- 10: Androecium with 16–24 stamens and no staminodes; antipetalous filaments 1.2–1.7 mm long. Seeds with a small hilum (Rawlinson Ra. area, WA–Harts Ra. area, NT)..... **7. R. polystemonea**
- 10: Androecium with 15 stamens and 5–21 staminodes; antipetalous filaments 0.8–1.3 mm long; staminodes with a connective gland but no thecae. Seeds with a large flat hilum
- 11: Leaf blades 0.5–0.6 mm wide, about as thick as wide; abaxial surface either uniformly curved or flattened for most of its width. Staminodes 5–11. Ovules usually 3 in all loculi of the ovary, rarely 4 in some or most loculi (Die Hardy Ra.–Parker Ra.–Bullabulling, WA)..... **9. R. triplex**
- 11: Leaf blades 0.8–1.2 mm wide, mostly distinctly wider than thick; abaxial surface with a flattened section down the centre, which is narrower than the margins and often hollowed down the middle. Staminodes 10–21. Ovules usually 2 in all loculi of the ovary, rarely with a combination of 2- and 3-ovulate loculi (Merredin–Hatter Hill, WA)..... **8. R. torquata**
- 9: Stamens 5–10(–12), without staminodes. Filaments flattened
- 12: Stamens 10, free. Antipetalous filaments 0.25–0.6 mm wide, attenuate or somewhat narrowed distally, with versatile anther protruding well above filament's apex. Seeds lacking an aril
- 13: Young leaves very rugose-glandular. Mature leaves 0.5–0.8 mm thick, entire (Bencubbin–Coolgardie–near Hunt Ra.–near Norseman, WA)..... **4. R. carnosa**

- 13: Young leaves not very rugose. Mature leaves up to 0.4 mm thick, with minutely fringed margins
- 14: Leaves thick. Antipetalous filaments 1.2–1.4 mm long, 0.4–0.6 mm wide. Mature style 2–2.7 mm long (Southern Cross area, WA) ..... **5. *R. fimbriolata***
- 14: Leaves fairly flat. Antipetalous filaments 0.6–0.8 mm long, 0.25–0.35 mm wide. Mature style 1.2–1.8 mm long (Parker Ra., WA) ..... **6. *R. medifolia***
- 12: Stamens 5–12; antisepalous filaments (when present) united very shortly or for up to *c.* 1/3 of their length to the antipetalous filaments. Antipetalous filaments 0.5–1 mm wide, emarginate, truncate or obtuse, with non-versatile anther attached to the inner surface and often exceeded by filament's apex. Seeds with an obvious aril in most species (very reduced or apparently absent in *R. rubra*)
- 15: Leaves thin, with margins slightly to prominently recurved, discolorous. Mature pedicels (4–)7–37 mm long
- 16: Leaves obtuse. Ovules 8–12 per loculus. Seeds shortly tuberculate (Fitzgerald River NP, WA) ..... **2. *R. oxycoccoides***
- 16: Leaves acute. Ovules 4–8 per loculus. Seeds ± smooth
- 17: Flowers 5–8 mm diam. Stamens scarcely united at base. Ovules 4–6 per loculus, mostly 5. Aril 0.5–0.7 mm long (near Parry Inlet–near Bremer Bay, WA) ..... **3. *R. schollerifolia***
- 17: Flowers 8–13.5 mm diam. Stamens united for *c.* 1/4–1/3 of length of antisepalous filaments. Ovules 5–8 per loculus, mostly 6–8. Aril usually 0.8–1 mm long. (Stirling Ra.–Jerramungup, WA) ..... **1. *R. longifolia***
- 15: Leaves usually thick, rarely thin and with level margins, concolorous. Mature pedicels 0.8–4(–6.5) mm long
- 18: Anther loculi protruding beyond apex of filament. Ovules 4–9 per loculus. Seed minutely tuberculate; aril absent or rudimentary (Frank Hann NP–Bremer Ra., WA) ..... **15. *R. rubra***
- 18: Anther loculi usually exceeded by filament, only the connective gland protruding. Ovules 3(–5) per loculus. Seed smooth; aril obvious, 0.6–1 mm long
- 19: Leaves commonly overlapping the pair above by 1/5 or more of their length. Flowers white or pale pink (near Harrismith–Lake King, WA) ..... **10. *R. affinis***
- 19: Leaves rarely overlapping the pair above, and if so by no more than 1/5 of their length. Flowers usually pale to deep pink (near Esperance–Howick Hill, WA) ..... **13. *R. dimorphandra***

***Rinzia* sect. *Discolora*** Rye, *sect. nov.*

*Typus: Rinzia longifolia* Turcz.

Prostrate or low, spreading *shrubs*, often with adventitious roots. *Leaves* thin, discolorous, with denticulate to lacinate, slightly to markedly recurved margins. *Peduncles* ± absent or rarely up to 0.5 mm long, 1-flowered. *Bracteoles* persistent, entire or denticulate. *Pedicels* (4–)7–37 mm long. *Hypanthium* commonly minutely pitted. *Petals* white to bright pink. *Staminodes* absent. *Stamens* 5–10, usually 10 opposite the sepals and petals, when 5 then antipetalous, scarcely connate at base or for up to *c.* 1/3 of the length of antisepalous filaments. *Antipetalous filaments* flattened, (0.4–)0.5–0.8(–1) mm

wide; apex  $\pm$  reaching or exceeding top of anther, often emarginate, with whitish papillae. *Anthers* attached on inner surface of filament, not versatile. *Ovary* c. 1/2-inferior; ovules 4–12 per loculus. *Style* 1.2–2.3 mm long; stigma capitate. *Fruits* pendulous, largely superior. *Seeds* 1.3–1.8 mm long, smooth to deeply colliculate, medium to dark brown or black; inner surface with a large, whitish aril.

*Diagnostic features.* Distinguished from all other sections of *Rinzia* in having thin, distinctly discoloured leaves, and usually longer pedicels. Other important characters are: stamens normally 10, opposite sepals and petals; filaments flat, slightly to markedly connate; ovules 4–12 per loculus; seeds arillate.

*Distribution and phenology.* Endemic to the south-west of Western Australia (Figure 2A). The three species of sect. *Discolora* are geographically distinct; two of them have a relatively small distribution, which is located in each case just beyond the much larger range of the third species, *R. schollerifolia*. All of them tend to have long flowering periods, probably related to their occurrence near the south coast where rainfall is less seasonal than in central and northern parts of the south-west.

*Etymology.* From the Latin *discolor* (variegated, not of uniform colour), referring to the discoloured leaves.

*Notes.* Young leaves are obviously denticulate to lacinate in this section, but older leaves may become more or less entire.

**1. *Rinzia longifolia*** Turcz., *Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Pétersbourg* 10: 331 (1852). *Type:* Swan River colony [Stirling Range to Cape Riche to Mt Barren Range, Western Australia, 1848], *J. Drummond* coll. 5: 121 (*holo:* KW 001001297; *iso:* G 00227681, MEL 73045, PERTH 01053477).

*Rinzia morrisonii* Trudgen, *Nuytsia* 5: 423–424 (1986). *Type:* on Stirling Range Drive to Red Gum Pass, c. 9 km north-west of Chester Pass turnoff, Stirling Range National Park, Western Australia, 1977, *E.N.S. Jackson* 3329 (*lecto:* AD 97749414, here designated).

*Illustration.* M.E. Trudgen, *Nuytsia* 5: 419, Figure 2, second row on right (1986) [as *R. morrisonii*].

*Shrub* usually 0.1–0.2 m high, 0.2–0.6 m across, prostrate or scrambling, producing adventitious roots from prostrate main stems. *Petioles* 0.3–0.8 mm long. *Leafblades* narrowly oblong to ovate, 3–10.5 mm long, 1.3–2.3 mm wide, acute; margins slightly to distinctly recurved, minutely denticulate to lacinate. *Bracteoles* 2–3.5 mm long. *Pedicels* 10–37 mm long. *Flowers* 8–13.5 mm diam. *Hypanthium* 1.5–2.3 mm long. *Sepals* 1.1–2.5 mm long, denticulate or  $\pm$  entire. *Petals* 3–6 mm long, white or pink. *Stamens* 10, connate for 0.4–0.6 mm. *Antipetalous filaments* 1.4–2 mm long, 0.5–0.7 mm wide. *Antisepalous filaments* 0.8–1.3 mm long, 0.3–0.5 mm wide. *Anthers* 0.35–0.5 mm long. *Ovules* (5?) 6–8 per loculus. *Style* 1.4–2.3 mm long. *Fruits* 2–3 mm long. *Seeds* 1.4–1.8 mm long, 0.55–0.8 mm wide, 0.8–1 mm thick,  $\pm$  smooth, reticulate; aril 0.8–1 mm long.

*Diagnostic features.* Distinguished from other members of sect. *Discolora* by the following combination of characters: leaves acute; flowers 8–13.5 mm diam.; stamens united at base for c. 0.5 mm; ovules usually 6–8 per loculus.

*Selected specimens examined.* WESTERN AUSTRALIA: Hume Peak, Stirling Range, 1 Oct. 1995, *S. Barrett* 519 (PERTH); 1 km W of Moingunup Swamp, Stirling Range, 12 May 1982, *G.J. Keighery* 4853 (PERTH); Stirling Range, Oct. 1867, *F. Mueller s.n.* (MEL 76203); near Gold Hole, Chester Pass,

Stirling Range, Nov. 1983, *K.R. Newbey* 9816 (PERTH); Corackerup Nature Reserve, 4 Nov. 1992, *C.J. Robinson* 1000 (PERTH); Monjebup North, 10 Aug. 2016, *E.M. Sandiford* EMS 2325 (PERTH).

*Distribution and habitat.* Widespread in Stirling Range National Park, extending north-east to Jerramungup. Occurs in sandy soils or clay, usually in heath or mallee shrubland, sometimes on rocky hillsides or associated with watercourses.

*Phenology.* Flowers mainly from August to November, with mature fruits recorded in October and November.

*Conservation status.* *Rinzia longifolia* was listed by Jones (2015) as Priority One under Department of Parks and Wildlife Conservation Codes for Western Australian Flora; however, its enlarged circumscription has led to its status being downgraded to Priority Three (Western Australian Herbarium 1998–). The recorded range of *R. longifolia* is now over 100 km long with populations in Stirling Range National Park, Corackerup Nature Reserve and another relatively protected site.

*Etymology.* From the Latin *longi* (long-) and *-folius* (-leaved). *Rinzia longifolia* has longer leaves on average than other members of the genus except for *R. crassifolia* and *R. schollerifolia*.

*Common name.* Creeping *Rinzia*.

*Typification.* According to the protologue of *R. morrisonii* (Trudgen 1986a: 423) the holotype is lodged at PERTH and isotypes at AD, CANB and K. However, the holotype and the CANB and K isotypes cannot be located and there is no evidence on the AD specimen that duplicates were ever distributed. Since all attempts to relocate the missing material have failed, the AD isotype is selected here as the lectotype.

*Notes.* Trudgen (1986a) described *R. longifolia* *s. str.* in his key as ‘Plants with main stems prostrate and branchlets erect, short, usually densely leaved; antepetalous stamens 1.9–2.4 mm long’, whereas his new species *R. morrisonii* was described as ‘Plants variable in form (including prostrate) but otherwise not as above; antepetalous stamens 1.6–1.8 mm long’. The two species were considered to be allopatric, with *R. morrisonii* restricted to the Stirling Range and *R. longifolia* occurring to the north-east. Elsewhere, Trudgen compared both taxa to *R. schollerifolia* rather than to one another, justifying the recognition of *R. longifolia* *s. str.* on its distinctive habit, which he considered to be ‘unique in the genus and indeed in the subtribe Baeckeinae’ (Trudgen 1986a: 423, 425). While he did collect material from one population of *R. morrisonii* he did not visit any populations of *R. longifolia* *s. str.*, basing his assessment of its habit purely on the four old herbarium collections cited in his paper. However, there is no clear difference in habit evident from the herbarium specimens placed under the two taxa, and stamen lengths also do not fall into two distinct categories. Furthermore, two recent collections (*C.J. Robinson* 1000 & *E.M. Sandiford* EMS 2325) have increased our knowledge of *R. longifolia* *s. str.*, and it is now clear that habit is too variable to be taxonomically informative: Libby Sandiford (pers. comm.) observed both kinds of habit occurring intermixed within a single large population.

Specimens collected in the Stirling Range have longer leaves and smaller flowers on average than those of *R. longifolia* *s. str.* but show considerable overlap in their measurements for all organs. As the total variation observed within the group has no discontinuities there appears to be no firm basis for recognising species or even subspecies. Many other species of *Rinzia* show a similar or greater range of morphological variation. Consequently, *R. morrisonii* is reduced here to a synonym of *R. longifolia*.

**2. *Rinzia oxycoccoides*** Turcz., *Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Pétersbourg* 10: 331 (1852). *Hypocalymma oxycoccoides* (Turcz.) Nied., in H.G.A. Engler & K.A.E. Prantl, *Nat. Pflanzenfam.* 3(7): 99 (1893). *Type*: south-western Australia [Stirling Range to Cape Riche to Mt Barren Range, Western Australia, 1848], *J. Drummond* coll. 5: 120 (*holo*: KW 001001298; *iso*: BM 001015092, G 00227680, K 000843236, MEL 72892 & 72893, NSW 547593, PERTH 01139479).

*Baeckea oxycoccoides* Benth., *Fl. Austral.* 3: 75 (1867), *nom. illeg.* *Type*: south-western Australia [Stirling Range to Cape Riche to Mt Barren Range], Western Australia, 1848, *J. Drummond* coll. 5: 120 (*syn*: BM 001015092, G 00227680, K 000843236, KW 001001298, MEL 72892 & 72893, NSW 547593, PERTH 01139479).

*Illustrations*. Drawings on *C.A. Gardner* 2971 (PERTH); W.E. Blackall & B.J. Grieve, *How Know W. Austral. Wildfl.* 3A: 69 (1980) [as *Baeckea oxycoccoides*]; M.E. Trudgen, *Nyctisia* 5: 419, Figure 2, third row on left (1986).

*Sub-shrub* usually *c.* 0.1 m high, prostrate or almost so, up to 1 m wide. *Petioles* 0.5–1 mm long. *Leaf blades* narrowly ovate-oblong to almost circular, 2–7(–8) mm long, 1.5–3.2(–3.5) mm wide, obtuse; margins prominently recurved, denticulate to shortly lacinate. *Bracteoles* 1.5–2(–3.5) mm long. *Pedicels* 10–35 mm long. *Flowers* 10–15(–19) mm diam. *Hypanthium* 1.7–3.3 mm long. *Sepals* 1–1.7 mm long, ciliate-denticulate to lacinate. *Petals* 4–6(–8.5) mm long, white to bright pink. *Stamens* 10, scarcely connate. *Antipetalous filaments* 1.5–2.3 mm long, 0.4–0.8(–1) mm wide. *Antisepalous filaments* 1.3–1.8 mm long, 0.3–0.8 mm wide. *Anthers* 0.35–0.5 mm long. *Ovules* 8–10(–12) per loculus. *Style* 1.5–1.8 mm long. *Fruits* 3–3.5 mm long. *Seeds* 1.6–1.8 mm long, *c.* 0.75 mm wide, *c.* 1 mm thick, shortly tuberculate; aril *c.* 1 mm long.

*Diagnostic features*. Distinguished from other members of sect. *Discolora* by its obtuse leaves, 8–12 ovules per loculus, and tuberculate seeds.

*Selected specimens examined*. WESTERN AUSTRALIA: Thumb Peak, 15 Nov. 1995, *S. Barrett* 518 (PERTH); on track between Quoin Head Rd and Whalebone Beach, Fitzgerald River National Park, 10 Oct. 2003, *M. Hislop* 3045 (NSW, PERTH); Whoogarup Range, SE spur, Fitzgerald River National Park, 26 Sep. 1997, *F. Obbens* 4/97 (PERTH); Two Bump Hill summit, Fitzgerald River National Park, 26 Jan. 1994, *C.J. Robinson* 1198 (PERTH).

*Distribution and habitat*. Extends from Eyre Range south-west to Mt Bland, Fitzgerald River National Park. Occurs on rocky hillsides and low summits, often in quartzite, in shrublands rich in Proteaceae and Myrtaceae.

*Phenology*. Flowers recorded from September to January, and mature fruits from October to January.

*Conservation status*. This species is not considered to be under threat. Its known range is about 70 km long and falls entirely within Fitzgerald River National Park.

*Etymology*. The epithet refers to the resemblance of this *Rinzia* to the Cranberry genus *Oxycoccus* Hill, now treated as a synonym of *Vaccinium* L. (Ericaceae). See also the etymology of *R. schollerifolia* below.

*Common name*. Large-flowered *Rinzia*.



*Notes.* Several of the type specimens cited above give the year as 1849, perhaps the year when material was received in Europe, but the specimens from this part of Drummond's fifth collection were picked in 1848 (see Erickson 1969). The G isotypes of both species give the year as 1848 and the PERTH isotypes have been corrected to this date.

*Rinzia oxycoccoides* differs from other members of sect. *Discolora* in having obtuse leaves and the stamens scarcely united. It normally has white or pink flowers of 10–15 mm diameter. One spectacular collection from the north-eastern end of the distribution (*A.S. Weston* 12797) has the largest flowers recorded in the genus; they are bright pink and *c.* 19 mm diameter. This collection also has much larger bracteoles (3–3.5 mm long) than the other specimens and the largest leaves with the greatest laceration of their margins. However, there is one other specimen from the same general area (*A.S. George* 7252) that seems much more similar to the specimens from the remainder of the range.

**3. *Rinzia schollerifolia*** (Lehm.) Trudgen, *Nuytsia* 5: 422 (1986). *Baeckea schollerifolia* Lehm., *Pl. Preiss.* 2: 369 (1848). *Hypocalymma schollerifolium* (Lehm.) Nied., in H.G.A. Engler & K.A.E. Prantl, *Nat. Pflanzenfam.* 3(7): 99 (1893). *Type:* Seven Mile Bridge [*c.* 11 km N of Albany], Western Australia, Oct. 1840, *J.A.L. Preiss* 2015 (*syn:* LD 1088747, M 0170961, MEL 73042–73044, S S07-11672, ?W [photograph PERTH 01631861]).

*Illustrations.* Drawings on *E.H. Wilson & D.A. Herbert* 337 (PERTH); W.E. Blackall & B.J. Grieve, *How Know W. Austral. Wildfl.* 3A: 69 (1980) [as *Baeckea schollerifolia*]; M.E. Trudgen, *Nuytsia* 5: 419, Figure 2, third row on right (1986).

*Sub-shrub* 0.05–0.2 m high, up to 0.6 m wide, low-growing, sometimes with adventitious roots from prostrate main stems. *Petioles* 0.3–1 mm long. *Leaf blades* ovate or narrowly ovate, 4–11 mm long, 1.3–2.5 mm wide, acute; margins usually slightly to distinctly recurved, denticulate. *Bracteoles* 1.6–3 mm long. *Pedicels* 4–22 mm long. *Flowers* 5–8 mm diam. *Hypanthium* 1.4–3 mm long. *Sepals* 1–1.7 mm long, denticulate. *Petals* 2.5–3.5 mm long, white to bright pink. *Stamens* 5–10, very shortly connate. *Antipetalous filaments* 1.2–1.7 mm long, 0.5–0.8 mm wide. *Antisepalous filaments* (when present) 0.7–1.3 mm long, 0.3–0.4 mm wide. *Anthers* 0.25–0.4 mm long. *Ovules* 4–6 per loculus. *Style* 1.2–1.4 mm long. *Fruits* 2–2.8 mm long. *Seeds* 1.3–1.6 mm long, 0.6–0.7 mm wide, 0.75–0.9 mm thick, smooth, minutely reticulate; aril 0.5–0.7 mm long.

*Diagnostic features.* Distinguished from other members of sect. *Discolora* by the following combination of characters: flowers 5–8 mm diam.; stamens 5–10, scarcely united at the base; ovules 4–6 per loculus; seeds smooth, with aril 0.5–0.7 mm long.

*Selected specimens examined.* WESTERN AUSTRALIA: Woodlands Block, Porongurup Range, 5 Oct. 2000, *A. Burchell* 415 (PERTH); Old Railway Reserve, *c.* 2 km W from Happy Valley Rd, Denmark Shire, 13 Oct. 1999, *B.G. Hammersley* 2276 (PERTH); 1 km W from Kordabup Rd, 8 Sep. 2000, *B.G. Hammersley* 2630 (PERTH); Goode Beach, Torndirrup, 18 km SSW of Albany, 27 July 1986, *G.J. Keighery* 8210 (PERTH); W of Pfeiffer Rd, South Stirling Nature Reserve, 5 Oct. 2006, *E.M. Sandiford* EMS 1308 (PERTH); 1 km along Pfeiffer Rd from intersection with Pleasant Rd [*c.* 7 km NE of Manypeaks], 2 Sep. 1986, *P.S. Short* 2658, *M. Amerena & B.A. Fuhrer* (PERTH).

*Distribution and habitat.* Occurs from near Parry Inlet east to near Bremer Bay, often associated with laterite or granite or in sandy winter-wet flats, in a variety of vegetation types including Jarrah forest.

*Phenology.* Flowers and fruits from July to December.

*Conservation status.* This species is recorded from many localities, including Two Peoples Bay Nature Reserve and South Stirling Nature Reserve, within a range more than 200 km long, and is not considered to be under threat.

*Etymology.* The epithet refers to the resemblance of the leaves to those of *Schollera* Roth (Ericaceae). *Schollera*, like *Oxycoccus* (see the etymology of *R. oxycoccoides* above), is now treated as a synonym of *Vaccinium*.

*Common name.* Cranberry Rinzia.

*Notes.* Of the species included in sect. *Discolora*, *R. schollerifolia* has the smallest flowers and the fewest ovules on average, and is the only species to sometimes have the number of stamens reduced below ten, even down to five (lower than recorded in Trudgen 1986a). Its ovule number reaches a higher level than recorded previously, being up to six per loculus.

**Rinzia** sect. **Mesostemon** Rye, *sect. nov.*

*Typus:* *Rinzia carnosa* (S.Moore) Trudgen.

‘*Latistemon*’ ms in B.L. Rye, *Nuytsia* 19: 320 (2009).

Spreading or erect *shrubs* up to 1.3 m high, with very slender stems. *Leaves* concolorous, obtuse. *Peduncles* almost absent or up to 0.6 mm long, 1-flowered. *Bracteoles* persistent. *Pedicels* 0.8–3 mm long. *Petals* white to medium pink. *Staminodes* absent. *Stamens* 10 in all or most flowers, opposite the sepals and petals, free. *Antipetalous filaments* flattened, 0.25–0.6 mm wide; apex narrow, well below top of anther. *Anthers* versatile. *Ovary* largely superior; ovules 3–6 per loculus, in an arch. *Style* 1.2–2.7 mm long; stigma capitate. *Fruits* fairly erect, largely superior (3/4–4/5-superior). *Seeds* (where known) 1.3–1.6 mm long, medium brown to black, finely colliculate; inner surface without an aril or any other large features, with a hilum up to *c.* 0.2 mm diam. somewhat above middle.

*Diagnostic features.* Differs from all other sections of *Rinzia* in having stamens with a free filament that is flattened but only of medium width. Other important characters are: stamens 10, opposite sepals and petals; ovules 3–6 per loculus; seeds non-arillate.

*Distribution and phenology.* Endemic to the south-east of Western Australia, occurring in the central inland part of the South West Botanical Province and the adjacent part of the Eremaean Botanical Province (Figure 2A). Although the three species of sect. *Mesostemon* are not known to co-occur, both *R. fimbriolata* and *R. medifila* Rye & Trudgen occupy a small area near the centre of the range of the much more widespread species, *R. carnosa*. Flowering is more seasonal in sect. *Mesostemon* than in sections *Discolora* and *Rinzia*, occurring in winter and spring, from July to October, especially in August and September.

*Etymology.* From the Greek *meso-* (middle-) and *-stemon* (-stamen), referring to the intermediate width of the stamen filaments in comparison with the broad filaments of sections *Discolora* and *Rinzia* and the narrow filaments of sections *Polyandra* and *Semasperma*.

*Notes.* The group now known as sect. *Mesostemon* was included in Trudgen (1986a) but only one of the three species recognised here was described. Although the anthers are versatile in this section,

they do not appear to be as flexible as in sections *Polyandra* and *Semasperma*.

**4. *Rinzia carnos*** (S. Moore) Trudgen, *Nuytsia* 5: 426 (1986). *Baeckea carnos* S. Moore, *J. Linn. Soc. Bot.* 45: 175 (1920). *Type*: Bruce Rock, Western Australia, 1916, *F. Stoward* 315 (*holo*: BM 001015091; *iso*: MEL 72570).

*Baeckea minutifolia* Cheel, *J. & Proc. Roy. Soc. W. Austral.* 10: 5 (1923). *Type*: Westonia, Western Australia, April 1918, *F.M.C. Schock s.n.* (*holo*: NSW 122996 & 536430 [see *Typification* below]).

*Illustrations*. W.E. Blackall & B.J. Grieve, *How Know W. Austral. Wildfl.* 3A: 68 (1980) [as *Baeckea carnos*]; M.E. Trudgen, *Nuytsia* 5: 419, Figure 2, bottom row on right (1986); drawings on *C.A. Gardner* 2746.

*Shrub* 0.3–1.2 m high, 0.35–1.3 m wide; flowering branchlets with 1 or 2 pairs of flowers. *Leaves* appressed or rarely slightly overlapping on young branchlets, distant and appressed on older branchlets. *Petioles* absent or up to 0.2 mm long. *Leaf blades* broadly obovate to almost circular in outline, 0.8–2(–2.5) mm long, 0.5–1.2 mm wide, 0.5–0.8 mm thick, obtuse, entire; adaxial surface shallowly concave to flat; abaxial surface deeply convex and irregularly marked by sunken oil glands with 1 row of usually 2–4 large oil glands on each side of midvein. *Bracteoles* 0.7–1.3 mm long, entire. *Pedicels* 1–3 mm long. *Flowers* 7–9.5 mm diam. *Hypanthium* 1.7–2.1 mm long, 2.2–2.8 mm diam.; free portion *c.* 0.7 mm long. *Sepals* depressed-ovate, 0.5–1 mm long, 1.2–1.5 mm wide, entire. *Petals* 2.3–3.7 mm long, white or pale pink, possibly sometimes rose pink. *Antipetalous filaments* commonly 1.3–1.5 mm long, 0.3–0.6 mm wide. *Antisepalous filaments* 0.5–0.7 mm long, 0.3–0.5 mm wide. *Anthers* 0.3–0.4 mm long. *Style* 1.7–2.7 mm long; stigma 0.1–0.2 mm diam. *Ovules* 3–6 per loculus. *Fruits* 1.7–2.4 mm long, 2.1–2.3 mm diam. *Seeds* 1.3–1.6 mm long, 0.6–0.7 mm wide, 0.65–0.8 mm thick; testa dark brown or black.

*Diagnostic features*. Within sect. *Mesostemon*, this species has the thickest, most rugose leaves and is the only one with entire leaves and entire sepals.

*Selected specimens examined*. WESTERN AUSTRALIA: ex Jaurdi Station (proposed Conservation Park), 5 Oct. 2005, *V. Clarke* VJC 566 (PERTH); 5 km E of Bullabulling on Great Eastern Hwy, 27 Aug. 1997, *G. Flowers* 65 & *S. Donaldson* (CBG, PERTH); *c.* 2.8 km SE of Bungalbin Hill, [Helena &] Aurora Range, 24 Sep. 1995, *N. Gibson* & *M. Lyons* 2805 (PERTH); on flats E of Hunt Range and SW of Karrajong Rockhole, 20 July 1995, *N. Gibson* & *M. Lyons* 3694 (PERTH); 6.05 km S of railway line at Koonadgin Siding, SE of Merredin, 4 Nov. 2004, *B.L. Rye* 241144 & *M.E. Trudgen* (PERTH); *c.* 15 km SE of Bonnie Rock, 18 Sep. 2001, *L.W. Sage*, *C. Swift* & *R. Watson* WW 43-41 (PERTH); Westonia, Oct. 1918, *F.M.C. Schock s.n.* (BRI 225362, NSW, PERTH).

*Distribution and habitat*. Extends from Bencubbin east to Coolgardie and from near Hunt Range south-east to near Norseman. Recorded mostly from lateritic or granitic sites, with a wide variety of associated shrub species, including *Acacia* thickets.

*Phenology*. Flowers recorded from July to October, with mature fruits in September.

*Conservation status*. This species is fairly widespread and is not considered to be at risk.

*Etymology*. From the Latin *carnosus* (fleshy) as this species has fleshy leaves.

*Common name.* Fleshy-leaved Rinzia.

*Typification.* The only type material known for *B. minutifolia*, a synonym of *R. carnos*, is mounted on NSW 122996, but letters and documents relating to this specimen have been mounted on a separate sheet, NSW 536430. Hence there are two sheet numbers given for the holotype.

*Notes.* One of the specimens cited above, *L.W. Sage, C. Swift & R. Watson* WW 43-41, has particularly fleshy leaves, up to 1.2 mm wide and 0.8 mm thick, noticeably larger than those of the other specimens examined.

According to Trudgen (1986a: 427), flowers have a diameter of 5.5–7.5 mm and there are sometimes up to 12 stamens, with two stamens opposite some sepals. A larger flower size of 7–9.5 mm diameter was recorded here, and all flowers checked had ten stamens.

### 5. *Rinzia fimbriolata* Rye, *sp. nov.*

*Typus:* north of Southern Cross, Western Australia [precise locality withheld for conservation reasons], 21 September 1978, *R.J. Cranfield* 661 (*holo:* PERTH 05885906; *iso:* CANB).

*Baeckea* sp. Bullfinch (K.R. Newbey 5838); Western Australian Herbarium, in *FloraBase*, <https://florabase.dpaw.wa.gov.au/> [accessed 5 January 2016].

*Shrub* 0.4–0.7 m tall, 0.5–1.8 m wide; flowering branchlets with 1–4 pairs of flowers, when more than one pair then these often at distant nodes. *Leaves* densely clustered and somewhat spreading on young branchlets, absent or more appressed on older branchlets. *Petioles* 0.1–0.2 mm long. *Leaf blades* ± narrowly oblong to narrowly ovate, 2–2.8 mm long, 0.6–0.8 mm wide, 0.3–0.4 mm thick, obtuse, minutely fringed; adaxial surface shallowly concave to flat; abaxial surface somewhat angled, with a flat portion along the midrib and sloping sides, the sides each with 1 row of usually 4–6 large oil glands. *Bracteoles* 0.8–1.4 mm long, with a minutely fringed margin. *Pedicels* 1.5–2.3 mm long. *Flowers* 7–8 mm diam. *Hypanthium* c. 1.3 mm long, c. 2.3 mm diam.; free part c. 1 mm long, inconspicuously 10-veined. *Sepals* depressed-ovate, c. 0.6 mm long, 1.1–1.4 mm wide, minutely fringed, with a few very large oil glands. *Petals* c. 2.5 mm long, white. *Antipetalous filaments* 1.2–1.4 mm long, 0.4–0.6 mm wide. *Antisepalous filaments* 0.6–0.8 mm long, 0.3–0.4 mm wide. *Anthers* 0.3–0.4 mm long. *Ovules* 3–5 per loculus. *Style* 2–2.7 mm long; stigma 0.1–0.2 mm diam. *Fruits* not seen at maturity but at least 2.3 mm long and 2 mm diam.

*Diagnostic features.* Distinguished from other members of sect. *Mesostemon* by the combination of ciliolate leaves 0.3–0.4 mm thick, antipetalous filaments 1.2–1.4 mm × 0.4–0.6 mm, and style 2–2.7 mm long.

*Selected specimens examined.* WESTERNAUSTRALIA: [localities withheld for conservation reasons] 10 Sep. 1979, *K.R. Newbey* 5838 (PERTH); 8 Sep. 2005, *Peter G. Wilson* 1669 & *G.M. Towler* (NSW, PERTH).

*Distribution and habitat.* Extends from between Bullfinch and Southern Cross to c. 40 km south-west of Southern Cross, in south-western Australia (Figure 4A), recorded from sandy soil in mallee shrubland or woodland, also with one record from ‘clay soil with quartz pieces’.

*Phenology.* Flowers recorded in September.

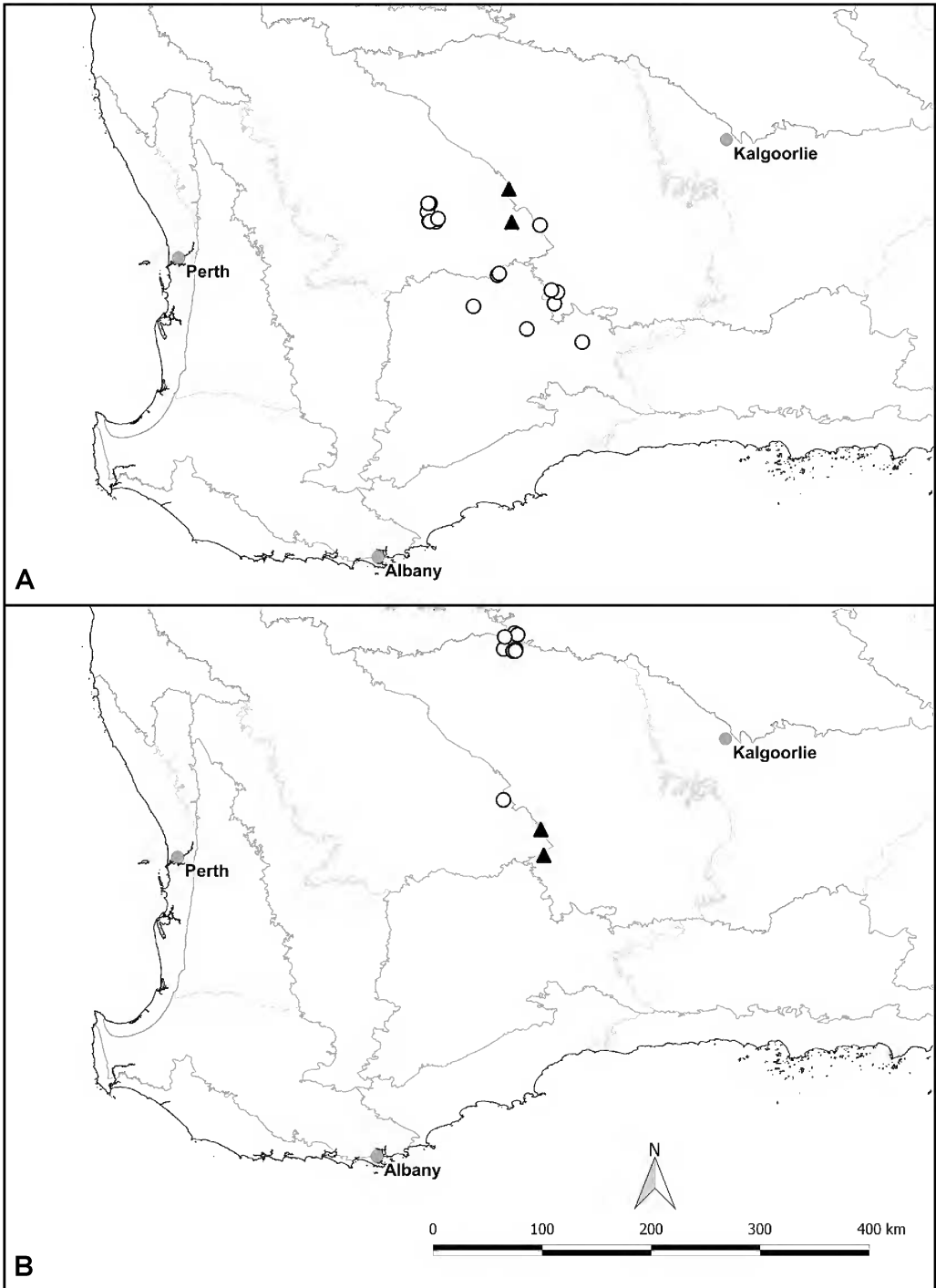


Figure 4. Distributions of new species of *Rinzia*. A—*R. fimbriolata* (▲) and *R. torquata* (○); B—*R. medifila* (▲) and *R. triplex* (○).

*Conservation status.* Listed as Priority One under Department of Parks and Wildlife Conservation Codes for Western Australian Flora (Jones 2015) under the name *Baেকেa* sp. Bullfinch (*K.R. Newbey* 5838). Known from at least four localities, extending over a distance of at least 50 km.

*Etymology.* The epithet alludes to the minutely fringed margins of the leaves, bracteoles and sepals.

*Common name.* Wheatbelt Rinzia.

*Notes.* *Rinzia fimbriolata* was previously (in Trudgen 1986a) confused with *R. rubra* Trudgen of sect. *Rinzia*. *Rinzia rubra* is similar to all members of sect. *Mesostemon* in its non-arillate or scarcely arillate seeds, and its range is further inland than normal for sect. *Rinzia*. However, it tends to be a lower plant and differs in its broader filaments with a 2-lobed summit and the anther attached against the front surface.

The above description of *R. fimbriolata* is based on examination of the type, the selected specimens cited above and three collections by Brian Moyle (*B. Moyle* 26–28). The Moyle specimens, which include a DNA voucher specimen (*B. Moyle* 26), are currently in the private collection of Malcolm Trudgen despite a request for them to be housed at PERTH (*B. Moyle* pers. comm.). Collections with mature fruits are still needed for *R. fimbriolata*; the largest fruits seen (on *B. Moyle* 27), were about 2.3 mm long and 2 mm wide, with a style 2 mm long.

## 6. *Rinzia medifila* Rye & Trudgen, *sp. nov.*

*Typus:* Parker Range, Western Australia [precise locality withheld for conservation reasons], 11 October 1994, *N. Gibson & M. Lyons* 2270 (*holo:* PERTH 05359325; *iso:* CANB, K, MEL).

*Euryomyrtus ciliata* Trudgen ms; G. Paczkowska & A.R. Chapman, *West. Austral. Fl.: Descr. Cat.* p. 386 (2000); Western Australian Herbarium, in *FloraBase*, <https://florabase.dpaw.wa.gov.au/> [accessed 5 January 2016].

*Euryomyrtus* sp. Parker Range (*N. Gibson & M. Lyons* 2269); Western Australian Herbarium, in *FloraBase*, <https://florabase.dpaw.wa.gov.au/> [accessed 5 January 2016].

*Shrub* up to 1 m tall, width not recorded; flowering branchlets with 1 or rarely 2 pairs of flowers. *Leaves* densely clustered and somewhat spreading on young branchlets, absent or more appressed on older branchlets. *Petioles* 0.2–0.4 mm long. *Leaf blades* ± oblong-elliptic, 1.8–3 mm long, 0.6–1.2 mm wide, up to 0.4 mm thick, obtuse, ciliolate; adaxial surface shallowly concave to flat; abaxial surface somewhat angled, with a flat portion along the midrib and sloping sides, the sides each with a row of usually 4–7 large oil glands. *Bracteoles* 1.1–1.5 mm long, minutely denticulate to ciliolate. *Pedicels* 0.8–1.3 mm long. *Flowers* 6–7 mm diam. *Hypanthium* 1.4–1.7 mm long, 2.5–3 mm diam.; free portion 0.6–0.8 mm long, 10-veined. *Sepals* depressed-ovate or depressed-elliptic, 0.5–0.6 mm long, 1.2–1.4 mm wide, denticulate or ciliolate, with a few very large oil glands. *Petals* 2–2.3 mm long, pale pink outside or apparently white throughout. *Antipetalous filaments* 0.6–0.8 mm long, 0.25–0.35 mm wide. *Antisepalous filaments* c. 0.5 mm long, 0.15–0.2 mm wide. *Anthers* 0.3–0.4 mm long. *Ovules* 3–5 per loculus. *Style* 1.2–1.8 mm long; stigma c. 0.2 mm diam. *Fruits* 1.7–2.3 mm long, 1.6–2 mm diam. *Seeds* not seen fully mature, 1.3–1.4 mm long, 0.6–0.7 mm wide, c. 0.5 mm thick; testa medium brown. (Figure 5)

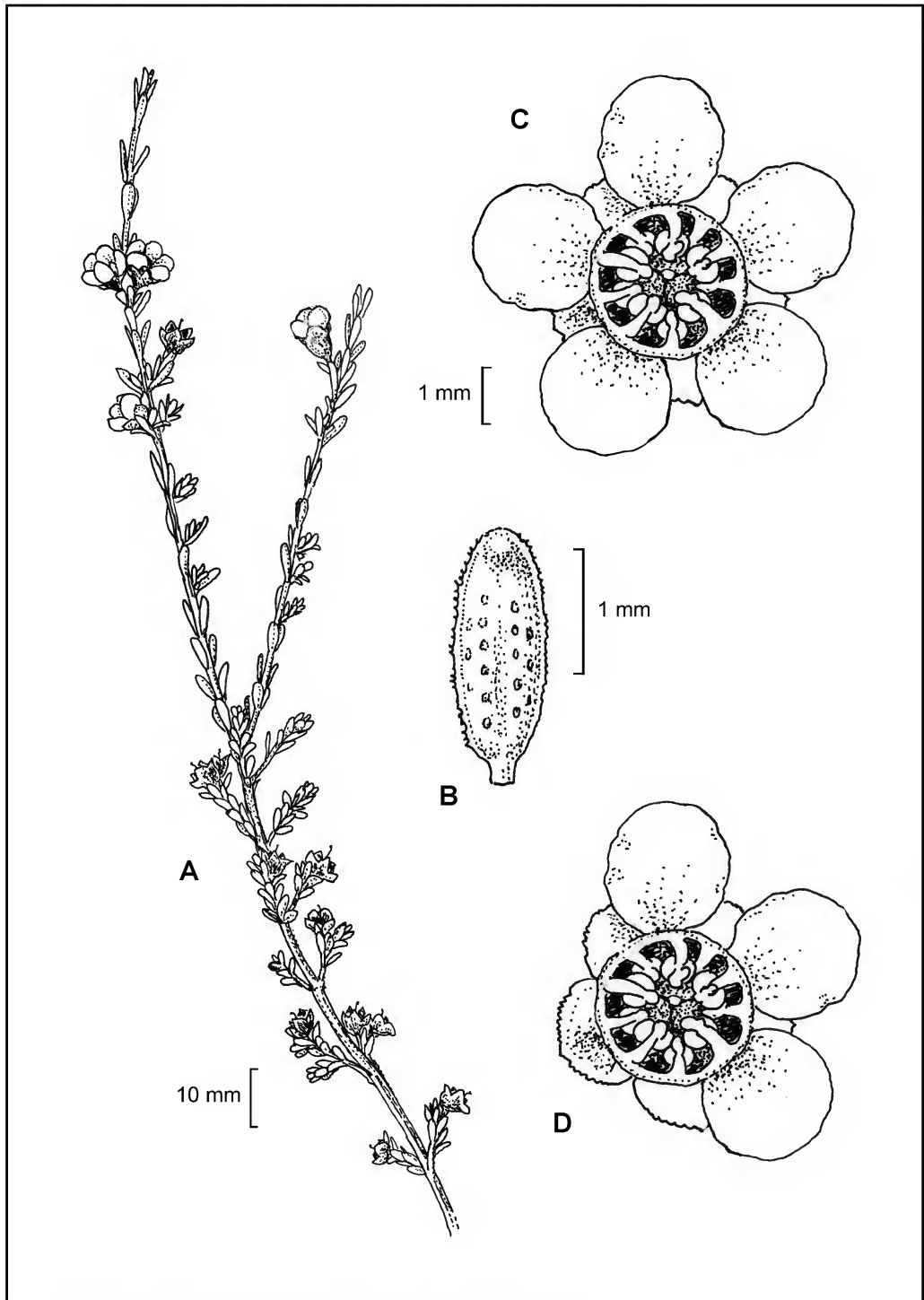


Figure 5. *Rinzia medifila*. A – flowering and fruiting branch; B – leaf; C – top view of flower; D – flower with two petals removed to show sepals. Drawn by M. Pieroni from N. Gibson & M. Lyons 2037.

*Diagnostic features.* Within sect. *Mesostemon* this species has the flattest leaves, smallest antipetalous filaments, which are 0.6–0.8 mm long and also tend to be narrower than in the other two species, and the shortest style, which is 1.2–1.8 mm long.

*Other specimens examined.* WESTERN AUSTRALIA: [localities withheld for conservation reasons] 17 Oct. 1994, N. Gibson & M. Lyons 2037 (AD, BRI, NSW, PERTH); 11 Oct. 1994, N. Gibson & M. Lyons 2269 (PERTH).

*Distribution and habitat.* Known only from Parker Range, south-east of Southern Cross (Figure 4B). Recorded in yellowish or reddish sandy soils, sometimes with laterite or greenstone, in *Eucalyptus* woodlands, often with *Melaleuca*.

*Phenology.* Flowers at least from September to October.

*Conservation status.* Listed as Priority One under Department of Parks and Wildlife Conservation Codes for Western Australian Flora (Jones 2015) under the name *Euryomyrtus* sp. Parker Range (N. Gibson & M. Lyons 2269). Known from two or three localities, with a range c. 35 km long.

*Etymology.* From the Latin *medius* (middle, intermediate) and *fila* (threads), as this species has filaments of medium width for the genus, which was part of the reason it was mistaken for a species of *Euryomyrtus*.

*Common name.* Parker Range Rinzia.

*Notes.* This species is poorly known, with the description based on only three specimens. It was previously misplaced in *Euryomyrtus*, initially as *E. ciliata* Trudgen ms and later as *E.* sp. Parker Range. *Euryomyrtus* differs from *Rinzia s. lat.* in having parallel venation on the adaxial surface of the leaves and floral colleters that are connate into obvious antipetalous groups. *Rinzia medifila* is actually most similar to *R. fimbriolata*, but has more flattened leaves that are less obviously ciliolate, smaller stamens and a shorter style. It also tends to have shorter pedicels although its peduncles may be slightly better developed.

**Rinzia** sect. **Polyandra** Rye & Trudgen, *sect. nov.*

*Typus:* *Rinzia polystemonea* (F.Muell.) Rye.

‘*Aethestemon*’ ms, in B.L. Rye, *Nuytsia* 19: 320 (2009).

‘*Xeromesos*’ ms, in B.L. Rye, *Nuytsia* 19: 320 (2009).

Erect *shrubs* up to 2.5 m tall. *Leaf blades* concolorous, with crowded oil glands. *Peduncles* less than 0.5 mm long, 1-flowered. *Bracteoles* caducous to persistent, ± entire. *Pedicels* 1–6 mm long. *Petals* white to bright pink. *Staminodes* (when present) 5–21, in antisepalous groups of 1–5, with a reduced filament or sessile and all or mostly with an obvious connective gland, those closest to centre of sepals shortest. *Stamens* 15–24, fairly uniformly spaced when 20 or more are present, but with antipetalous triads separated by broad spaces if antisepalous stamens are reduced to staminodes. *Filaments* free, ± terete, less than 0.25 mm wide; apex below top of anther. *Anthers* versatile. *Ovary* c. 1/2-inferior;



ovules 2–5 per loculus, collateral or in an arch. *Style* 0.9–2.5 mm long; stigma peltate. *Fruits* erect, just over 1/2- to 3/4-superior. *Seeds* broadest towards the apex, 1.6–2.1 mm long, brown, tuberculate; inner surface either with a central longitudinal ridge or with a circular rim, without an aril.

*Diagnostic features.* This section has the greatest shrub size recorded (up to 2.5 m high) in the genus, the broadest stigma, and on average the highest stamen numbers (15–24), sometimes combined with 5–21 staminodes. Other important characters are: stamens with a narrow filament; seeds borne on blackish placentas, tuberculate, and non-arillate.

*Distribution and phenology.* Two species occur in the central inland part of the South West Botanical Province and the adjacent part of the Eremaean Botanical Province of Western Australia and one in central Australia, in the far inland part of Western Australia and southern Northern Territory (Figure 3). Flowering is seasonal in the two south-western species but more opportunistic in the arid-zone species.

*Etymology.* From the Greek *poly-* (many-) and *-andrus* (-stamened), referring to the large numbers of stamens and sometimes staminodes.

*Notes.* This section has a large disjunction between the south-western and central Australian areas. The two south-western species differ from all other members of the genus in having staminodes and this distinctive group within sect. *Polyandra* was apparently collected for the first time in 1966, with the second species not collected until 1997. Had early taxonomists been aware of these two species, they might well have placed them in a separate genus or section in view of their unique staminodes, mostly with a full-sized connective gland. Where there are only two staminodes separating the triads of stamens, each staminode may be close to the margin of a group of stamens and separated by a distinct gap from the other staminode. Where there are more numerous staminodes, these are usually spaced fairly uniformly between stamen groups so there is no obvious disjunction between them. The filament is reduced to a short stalk or rarely absent. The function of the glandular staminodes needs investigation.

Although the central Australian species *R. polystemonea* has no staminodes, it does have short stamens in the positions where the staminodes occur in the south-western species, and the similarities it shows seem of more importance than the differences. All three species have an erect habit, leaves with crowded oil glands, a peltate stigma and placentas that become blackish as the seeds mature. While the seed-bearing placentas are almost black, the infertile placentas are much paler, sometimes white as illustrated in Figure 1G.

There are both similarities and differences in the seeds of the south-western and central Australian species. All species have large seeds with a tuberculate testa and no aril. However, the centre of the inner surface of the seed has a longitudinal ridge in *R. polystemonea* (Figure 6E) whereas the two south-western species lack the ridge and instead have a distinctive, large, circular rim (Figure 1H).

## 7. *Rinzia polystemonea* (F.Muell.) Rye, *comb. nov.*

*Baeckea polystemonea* F.Muell., *Fragm.* 2: 124 (1861). *Type:* Brinkley's Bluff, Macdonnell Ranges, Northern Territory, 1860, *J. McDouall-Stuart s.n. (holo: MEL 72914).*

*Shrub* 0.5–2.5 m tall, erect to straggly or rarely low and spreading; flowering branchlets usually with 1–5 pairs of flowers. *Leaves* appressed or antrorse, often crowded. *Petioles* 0.2–0.5 mm long. *Leaf*

*blades* usually  $\pm$  narrowly oblong to linear, 3–7 mm long, 0.7–1.3 mm wide, either  $\pm$  flat or up to 0.5 mm thick, obtuse, entire; adaxial surface concave or channeled or fairly flat; abaxial surface convex with or without steep sides, or flattened on top and channeled, with oil glands in 2–4 main rows on each side of midvein. *Bracteoles* caducous to persistent, linear to ovate, 0.8–2.5 mm long, scarious. *Pedicels* 1.5–6 mm long. *Flowers* 7.5–10.5 mm diam. *Hypanthium* 1.7–3.1 mm long, 2.6–4.1 mm diam.; free part 0.8–1.1 mm long. *Sepals* depressed-ovate, 1–1.6 mm long, 1.6–2.6 mm wide, entire. *Petals* 2.7–3.7 mm long, pink or white. *Stamens* 17–24, with a triad opposite each petal and 0–2 small ones spaced between each triad. *Antipetalous filaments* 1.2–1.7 mm long. *Antisepalous filaments* 0.3–0.5 mm long. *Anthers* 0.3–0.5 mm long; connective gland 0.1–0.2 mm long. *Ovules* 2–5 per loculus, most commonly 4 or 5. *Style* 1.7–2.5 mm long; stigma 0.3–0.5 mm diam. *Fruits* with petals and stamens usually persistent, 3/5–3/4-superior, 2–2.7 mm long, 2.5–3 mm diam. *Seeds* 1.6–2.1 mm long, 0.7–0.8 mm wide, 0.7–0.8 mm thick; inner surface with a central longitudinal ridge. (Figure 6)

*Diagnostic features.* Distinguished from the two other species of sect. *Polyandra* by its more numerous stamens, the absence of staminodes, and by its seeds having a central longitudinal ridge on the inner surface rather than a circular structure.

*Selected specimens examined.* WESTERNAUSTRALIA: near Glen Helen, Rawlinson Range, 20 July 1967, *A.S. George* 8810 (PERTH); SE end of Rawlinson Range, 29 July 2000, *P.M. Olde, N. Marriott & C. Crouch* PMO 2000/298 (NSW, PERTH); Pingkalpiri (Bunggalbiri) Rockhole, Walter James Range, 26 June 1989, *D.J. Pearson* DJP 644 (PERTH). NORTHERN TERRITORY: Penny Springs, George Gill Range, 14 July 1968, *A.C. Beauglehole* 26767 (NT); Palm Valley, 25 Aug. 1956, *G. Chippendale* 2676 (AD, BRI, CANB, MEL, NSW, NT, PERTH); Kings Canyon, 10 Dec. 1968, *P.K. Latz* 278 (CANB, NSW, NT); Spencer Gorge, Chewing Range, 26 May 1977, *P.K. Latz* 7112 (BRI, CANB, K, MEL, NT, PERTH); Standley Chasm area, 8 Aug. 1976, *J.R. Maconochie* 453 (DNA, NT).

*Distribution and habitat.* Extends from Rawlinson Range in Western Australia east at least to the Macdonnell Ranges of Northern Territory, recorded on rocky slopes and cliff edges of quartzite, metaquartzite and sandstone, often near creeks or gorges, in skeletal soil, red sand and rocky soil. Also recorded in hummock grassland with *Acacia*, mallee and *Grevillea* species. *Rinzia polystemonea* occupies the central Australian part of the distribution shown for sect. *Polyandra* in Figure 3.

*Phenology.* Flowering collections have been made throughout the year. Flowering and fruiting probably occur at any time of the year, stimulated by irregular rainfall.

*Conservation status.* This species is known from numerous localities over an extensive range, and is not considered to be at risk.

*Etymology.* From the Greek *poly-* (many-) and *-stemon* (-stamened). A maximum of 24 stamens per flower has been recorded so far for this species; the highest number known in the remainder of the genus is 20.

*Common name.* Desert Rock-myrtle.

*Notes.* *Rinzia polystemonea* is geographically disjunct from all other members of the genus. It is the tallest member of the genus and has, on average, the largest number of stamens and the largest stigma. Molecular data discussed earlier strongly support this species as sister to the clade containing *R. torquata* and *R. triplex* Rye & Trudgen.

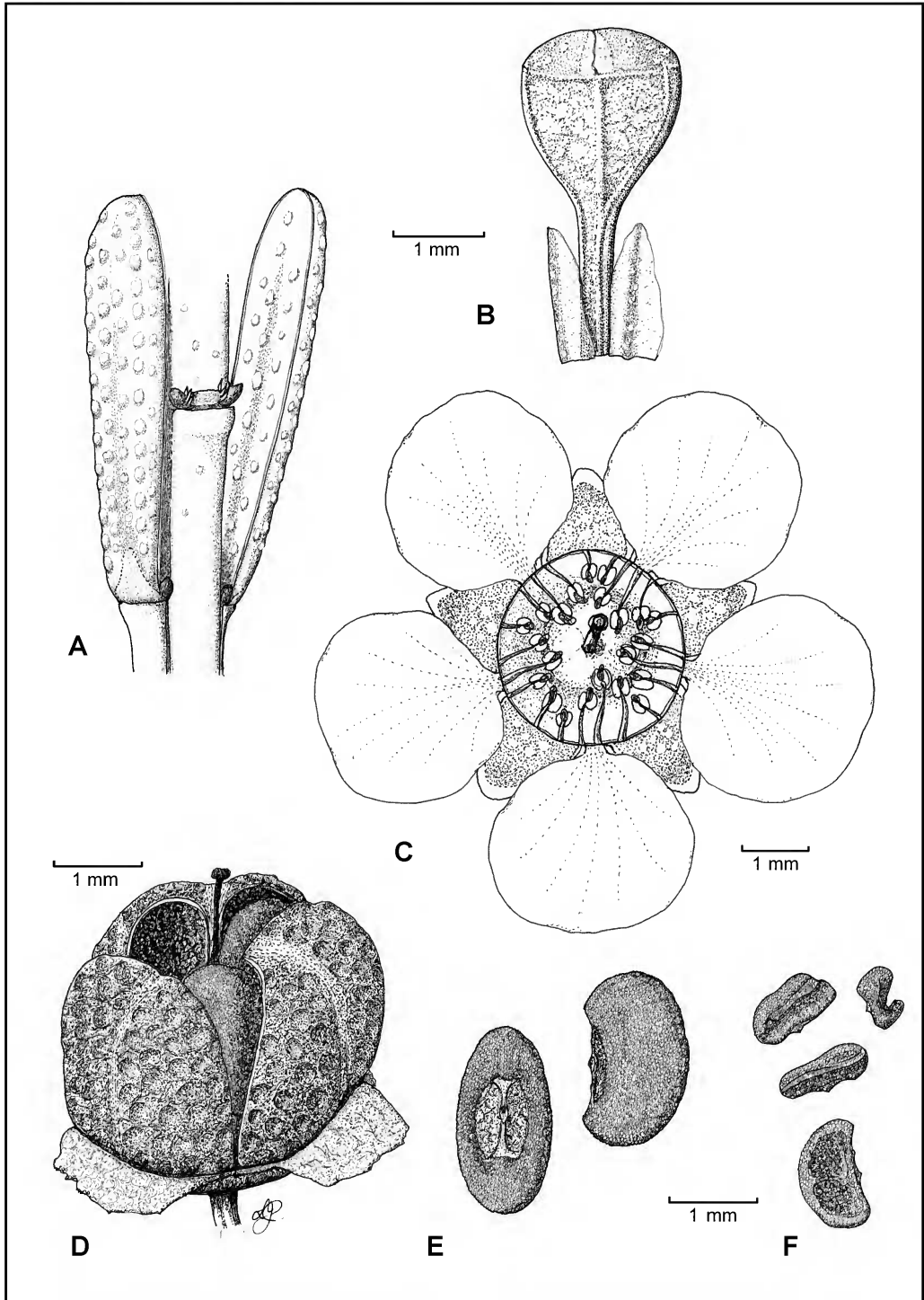


Figure 6. *Rinzia polystemonea*. A – opposite leaves; B – bracteoles, pedicel and flower bud; C – flower; D – fruit; E – inner and side views of seed; F – chaff. Drawn by L. Cobb from *A.S. George* 8810 (A–C) and *A.S. George* 8279 (D–F).

Where crowded on short branchlets, the leaves are usually obviously 4-ranked. Young leaves are occasionally slightly thicker than wide, but older leaves are wider than thick, often much wider.

Many specimens have relatively mature, unopened fruits, but very few have dehisced fruits attached. It appears from the few dehisced fruits examined that they do not open as widely as in other species, but a bigger sample of fruits is needed to confirm this. The petals tend to persist on young fruits.

### 8. *Rinzia torquata* Rye & Trudgen, *sp. nov.*

*Typus*: Hyden [area], Western Australia [precise locality withheld for conservation reasons], 10 August 2000, *J.M. Flint* 173 (*holo*: PERTH 05751926; *iso*: CANB, MEL).

*Baeckea* sp. Merredin (K.R. Newbey 2506); Western Australian Herbarium, in *FloraBase*, <https://florabase.dpaw.wa.gov.au/> [accessed 5 January 2016].

*Shrub* 0.5–1.7 m tall, up to at least 0.5 m wide, often multi-branched from ground level; flowering branchlets with usually 1 pair of flowers, but sometimes with 2 separated pairs. *Leaves* appressed to somewhat spreading, often crowded on the young branchlets. *Petioles* 0.1–0.2 mm long. *Leaf blades* narrowly obovate to oblong-elliptic in outline, 1.4–2.5 mm long, 0.8–1.2 mm wide, 0.4–0.8 mm thick, mostly distinctly wider than thick, obtuse, entire or rarely denticulate; adaxial surface shallowly concave to flat; abaxial surface flattened or convex between sloping sides that extend outwards, with oil glands in 2 or 3 main rows on each side of midrib. *Bracteoles* persistent, 1.1–1.7 mm long, largely herbaceous. *Pedicels* 1–4.5 mm long. *Flowers* 6.5–8.5 mm diam. *Hypanthium* 1.1–1.5 mm long, *c.* 2.5 mm diam.; free portion 0.5–0.7 mm long. *Sepals* very broadly ovate or depressed-ovate 1.0–1.3 mm long, 1.3–1.6 mm wide, entire or minutely denticulate. *Petals* 2.3–3 mm long, deep pink outside in bud, pink inside at first but becoming pale pink. *Antipetalous filaments* 0.8–1.3 mm long. *Anthers* 0.3–0.4 mm long. *Staminodes* 10–21, with 2–5 between each triad of stamens, when 2 then often with a large gap between them, when 4 then equidistant, mostly terminating in a broadly obovoid, red-brown or whitish (very pale brown) gland up to 0.4 mm long. *Ovules* 2(3) per loculus. *Style* 0.9–1.5 mm long; stigma 0.2–0.3 mm diam. *Fruits* *c.* 2.5 mm long, *c.* 2.5 mm diam.; fertile placentas very dark red-brown; immature or sterile placentas (when present) white or off-white. *Seeds* few per fruit, absent or 1 per loculus, 1.6–1.8 mm long, 1–1.2 mm wide, 1–1.2 mm thick; inner surface with a  $\pm$  circular rim surrounding a flat, whitish hilum 0.4–0.6 mm diam. (Figures 1, 7A)

*Diagnostic features.* Distinguished from other species of *Rinzia* in having 10–21 staminodes, the only other species with staminodes having 5–11 of them. Also distinguished from the other staminode-bearing species in having leaves 0.8–1.2 mm wide, mostly distinctly wider than thick, with oil glands in 2 or 3 irregular rows on each sloping side of midrib, and 2(3) ovules per loculus.

*Selected specimens examined.* WESTERN AUSTRALIA: [localities withheld for conservation reasons] 24 Aug. 1994, *H.H. Adamson* s.n. (PERTH 05320291); 10 Sep. 1990, *B. & B. Backhouse* H37A (PERTH); 10 Sep. 1966, *M. Barrow* 106 (KP, PERTH); 20 June 2005, *G.F. Craig* 6508 (PERTH); 22 June 2005, *G.F. Craig* 6544 (PERTH); Oct. 2000, *J.M. Flint* 33 B (PERTH); 15 Sep. 1976, *B.C. Habeley* 361 (PERTH); 9 Aug. 1979, *K.R. Newbey* 5460 (PERTH); 15 Oct. 2003, *B.L. Rye* 231085 & *M.E. Trudgen* (AD, BRI, NSW, PERTH); 4 Nov. 2004, *B.L. Rye* 241129 & *M.E. Trudgen* (PERTH); 12 Aug. 2003, *Peter G. Wilson* 1664 & *G.M. Towler* (PERTH); 6 Aug. 1974, *E. Wittwer* W 1282 (KP, PERTH).

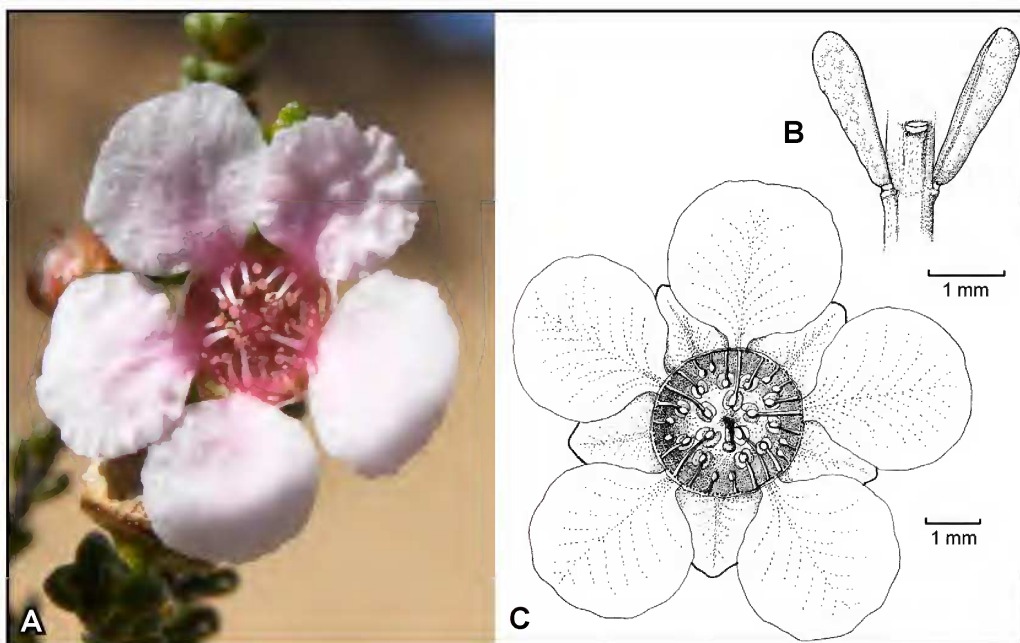


Figure 7. South-western Australian species of *Rinzia* sect. *Polyandra*. A—flower of *R. torquata*; B—opposite leaves of *R. triplex*; C—top view of flower of *R. triplex*. Image (A) taken by B.L. Rye (voucher B.L. Rye 231086 & M.E. Trudgen); drawings (B, C) by L. Cobb from M. Hislop 2968 & F. Hort.

*Distribution and habitat.* Extends from near Merredin east to Parker Range and south-east to near Hatter Hill (Figure 4A). Commonly occurs in yellow sand or lateritic habitats, sometimes with some clay, often in vegetation dominated by mallees, *Acacia*, *Allocasuarina* and *Melaleuca*.

*Phenology.* Flowers from July to October, with mature fruits recorded from October to early December.

*Conservation status.* Listed as Priority Three under Department of Parks and Wildlife Conservation Codes for Western Australian Flora (Jones 2015) under the name *Baেকেea* sp. Merredin (K.R. Newbey 2506). The known distribution is about 220 km long but the species does not appear to occur in any national parks.

*Etymology.* From the Latin *torquatus* (adorned with a necklace or collar) referring to the strings of staminodes linking the triads of stamens.

*Common name.* Necklace *Rinzia*.

*Notes.* This species is very similar to *R. triplex* but is distinguished as indicated by the diagnostic characters above; see also the notes under *R. triplex*. A somewhat isolated specimen from Parker Range, M.E. Trudgen 23352 A, differs from other specimens of both species in having minutely denticulate margins to its leaves.

Rather than having a complete circle of stamens and staminodes, some specimens, e.g. J.M. Flint 173, have the stamens and staminodes arranged mostly in five groups per flower, with a single staminode on each margin of the triad of stamens opposite each petal and a gap opposite each sepal.

### 9. *Rinzia triplex* Rye & Trudgen, *sp. nov.*

*Typus*: south of Moorine Rock, Western Australia [precise locality withheld for conservation reasons], 1 August 2003, M. Hislop & F. Hort MH 2968 (*holo*: PERTH 06465641; *iso*: CANB, MEL).

*Baeckea* sp. Parker Range (M. Hislop & F. Hort MH 2968); Western Australian Herbarium, in *FloraBase*, <https://florabase.dpaw.wa.gov.au/> [accessed 5 January 2016].

*Shrub* 0.3–1.5 m tall, up to at least 1.2 m wide; flowering branchlets with 1 pair of flowers or rarely 2 separated pairs. *Leaves* appressed to somewhat spreading, densely 4-ranked on the young branchlets. *Petioles* 0–0.15 mm long, poorly defined or absent. *Leaf blades* narrowly obovate to oblong-elliptic in outline, 1.5–2.2 mm long, 0.5–0.6 mm wide, 0.55–0.6 mm thick, obtuse, entire; adaxial surface shallowly concave to flat, when young often grooved along the centre; abaxial surface convex between ± vertical sides, with 4–6 very large oil glands in a main row on each side of midrib, with smaller glands often forming a second row. *Bracteoles* persistent, 1.2–2 mm long, largely herbaceous. *Pedicels* 2–3.5 mm long. *Flowers* 6–10 mm diam. *Hypanthium* 1.2–2 mm long, 2.5–3 mm diam.; free part 0.7–0.9 mm long. *Sepals* depressed-ovate, 1.5–1.6 mm long, 1.5–2 mm wide, entire. *Petals* 2.3–3.5 mm long, bright pink at first, becoming paler with age. *Antipetalous filaments* 0.9–1.3 mm long, bright pink. *Anthers* 0.3–0.4 mm long. *Staminodes* 5–11, 1 or 2(3) between each triad of stamens, often with a large gap between them, when 3 the central one shortest, mostly terminating in an obovoid, brown or pinkish gland, up to 0.5 mm long. *Ovules* 3(4) per loculus. *Style* 1.2–1.6 mm long; stigma 0.25–0.35 mm diam. *Fruits* not seen at maturity but *c.* 2/3-superior. *Seeds* not seen at maturity; inner surface with a circular cavity surrounding a flat, whitish hilum. (Figure 7B, C)

*Diagnostic features.* Distinguished from other members of the genus in having 5–11 staminodes, the only other species with staminodes having 10–21 of them. Distinguished from the other staminode-bearing species in having leaves 0.5–0.6 mm wide, about as thick as wide, with oil glands mainly in a single irregular row on each more or less vertical side of midrib and 3(4) ovules per loculus.

*Selected specimens examined.* WESTERNAUSTRALIA: [localities withheld for conservation reasons] 27 Aug. 1997, G. Flowers 66 & S. Donaldson (PERTH); 7 Aug. 2007, A. Markey & S. Dillon 5210 (PERTH); 23 Feb. 2005, S. McNee & G. O'Keefe LCH 12206 (PERTH); 1 Sep. 2010, S. Reiffer SRE 288 (PERTH).

*Distribution and habitat.* Extends from the Die Hardy Range area (north of Koolyanobbing), south to the Southern Cross area (Figure 4B). Recorded on sandy plains in yellow to red, often gravelly or lateritic soils, with one record mentioning fragments of banded ironstone, dominated by *Acacia*, *Eucalyptus* or *Allocasuarina*, often with *Baeckea elderiana* present. *Rinzia triplex* is often a significant component of the shrublands at these sites.

*Phenology.* Flowers recorded late June to September.

*Conservation status.* Listed as Priority Three under Department of Parks and Wildlife Conservation Codes for Western Australian Flora (Jones 2015) under the name *Baeckea* sp. Parker Range (M. Hislop & F. Hort MH 2968). The distribution of *R. triplex* is at least 230 km long.

*Etymology.* The epithet is Latin and refers to both the stamens and ovules, which are usually in groups of three (triads).

*Common name.* Triad Rinzia.

*Notes.* This species is very similar to *R. torquata*, but differs as indicated in the diagnostic characters and mainly occurs north of the range of *R. torquata*. The phrase name *Baeckea* sp. Parker Range was an inappropriate choice for *R. triplex* as *R. torquata* has been recorded from Parker Range but *R. triplex* does not extend so far south. *Rinzia triplex* often has five or ten fairly obvious ribs on the hypanthium and there are sometimes inconspicuous ribs on *R. torquata*, but this character may not be reliable in distinguishing the two taxa.

Mature seeds of *R. triplex* have not been seen, but the largest of the immature seeds examined appears to match the seeds of *R. torquata*. At least one flower of *R. triplex* was observed to have 16 rather than the usual 15 stamens, with one of the triads replaced by four stamens. Antipetalous colleters are often relatively conspicuous (up to 0.8 mm long) in this species.

### **Rinzia** Schauer sect. **Rinzia**

Prostrate or low, spreading *shrubs*. *Leafblades* plano-convex or concavo-convex, concolorous, without an apical point. *Peduncles* 1- or 2-flowered. *Bracteoles* persistent, usually  $\pm$  entire. *Pedicels* 0.8–6.5 mm long. *Petals* white to bright pink. *Stamens* (5–)10, opposite all the sepals and petals or (when less than 10) all or mostly antipetalous, connate at base. *Antipetalous filaments* flattened, 0.5–1.2 mm wide; apex usually reaching to far exceeding top of anther, often emarginate to 2-horned, distinctly papillate in most species. *Anthers* attached at front of filament, not versatile. *Ovary* largely superior to c. 1/2-inferior; ovules either 2 per loculus and collateral or 3–9 and in an arch or 2 rows. *Style* 0.6–2.5 mm long; stigma small, capitate or scarcely expanded. *Fruits* tending to be pendulous, largely superior. *Seeds* 1.3–2 mm long, smooth to shortly tuberculate, becoming dark brown to black at maturity; inner surface with a large whitish aril (absent or vestigial in *R. rubra*).

*Diagnostic features.* Distinguished from all other sections of *Rinzia* by the following combination of characters: concolorous leaves; stamens usually 10 opposite sepals and petals, rarely 5–9 and all or mostly antipetalous; filaments compressed, scarcely to markedly connate; seeds with an obvious aril (rudimentary to absent in one species).

*Distribution and phenology.* Fairly widespread in the South West Botanical Province of Western Australia (Figure 2B), with seven species restricted to this province and one, *R. sessilis*, extending into the Eremaean. The eight species of sect. *Rinzia* tend to have long flowering periods and several pairs of species overlap in range.

*Notes.* In a number of morphological characters, sect. *Rinzia* is the most varied section, for example in having ovule numbers ranging from two to nine per loculus. It appears that some species can regenerate after fire; for example, one specimen (*B.R. Maslin* 3859) of *R. affinis* has more than 20 slender stems arising from a thick base and a specimen of *R. crassifolia* (*B. Hort* 2669) is recorded as being multi-stemmed from a lignotuber.

**10. *Rinzia affinis*** Trudgen, *Nuytsia* 5: 431–432 (1986). *Type:* 14 km W of Newdegate, Western Australia, 12 August 1968, *Paul G. Wilson* 7032 (*holo:* PERTH 00999806; *iso:* CANB 367220, K 000821694, NSW 542229).

*Illustrations.* Drawings on *C.A. Gardner* 1770 (PERTH); M.E. Trudgen, *Nuytsia* 5: 419, Figure 2, top row on left (1986).

*Shrub* 0.1–0.7 m high. *Petioles* 0.2–0.5 mm long. *Leaf blades* usually narrowly oblong in outline, 2.5–5 mm long, 0.7–1 mm wide, *c.* 0.5 mm thick, obtuse to acute, entire. *Peduncles* 2-flowered; secondary axes  $\pm$  absent. *Bracteoles* 1.5–2.3 mm long. *Pedicels* 2–4 mm long. *Flowers* 8–11 mm diam. *Hypanthium* 1.3–2 mm long. *Sepals* 1–2.3 mm long. *Petals* 3–4.5 mm long, white or pale pink. *Stamens* 10, shortly connate. *Antipetalous filaments* 1.2–1.8 mm long, 0.6–0.9 mm wide. *Antisepalous filaments* 0.8–1.1 mm long, 0.3–0.5 mm wide. *Anthers* 0.3–0.5 mm long. *Ovules* 3–5 per loculus. *Style* 1.3–1.5 mm long. *Fruits* 2–2.3 mm long. *Seeds* 1.4–1.6 mm long, 0.5–0.55 mm wide, 0.7–0.8 mm thick, smooth, with an aril 0.8–1 mm long, extending to top end of seed.

*Diagnostic features.* Distinguished from all members of the genus except *R. dimorphandra* by the following combination of characters: peduncles 2-flowered; ovules 3–5 per loculus; seeds smooth, arillate. Distinguished from *R. dimorphandra* by minor characters including its usually paler petals.

*Selected specimens examined.* WESTERN AUSTRALIA: 1 km W of wheat bin, Tarin Rock railway line, 14 Oct. 2002, *E. Bishop* 130 (PERTH); Lake Magenta Nature Reserve, East Rd, 28 Sep. 2004, *A. Coates* 4834 *et al.* (AD, PERTH); S side of Siberia Rd, 5 km SE of Kukerin, 13 Sep. 2002, *J. Gray* 8 (PERTH); DoYLES Rd E of Geetabin Rd, Corrigin, 26 Sep. 1995, *M. Osborne* 362 (PERTH); adjacent to Old Newdegate Rd, N of Dunn Rock Nature Reserve, 30 Aug. 2006, *S. Walsh* 92 (PERTH); 7 km E of Tarco Rd, Lake King Nature Reserve, 28 Aug. 2002, *G. Woodman & C. Godden* FR 0208-24 (PERTH).

*Distribution and habitat.* Extends from near Harrismith east to Lake King, in sandy soils often over laterite, in species-rich heathlands. *Rinzia affinis* overlaps in range with several other members of sect. *Rinzia* and appears to hybridise with *R. communis* (see notes under that species below).

*Phenology.* Flowers from July to November, with mature fruits recorded in October and November.

*Conservation status.* Listed by Jones (2015) as Priority Four under Department of Parks and Wildlife Conservation Codes for Western Australian Flora. Although *R. affinis* has a much greater geographic range than several other *Rinzia* species that are not currently listed, such as *R. oxycoccoides*, and is known from at least three conservation reserves, its conservation status has been retained because the size and status of the majority of populations are unknown.

*Etymology.* The epithet is Latin and refers to its close similarity to *R. dimorphandra*, within which it was previously included.

*Common name.* Two-flowered Rinzia.

*Notes.* This species is closely related to *R. dimorphandra*, with both taxa having 2-flowered peduncles and narrow seeds (see Trudgen 1986a: Figure 2), but the sepals in *R. affinis* have a more obvious border, the petals are usually paler, and the leaves show a greater tendency to overlap those of the node above. The two taxa are geographically disjunct, with *R. affinis* occurring *c.* 150 km west of the range of *R. dimorphandra*.

Trudgen (1986a) also considered that the two taxa differ in their habitat, and separated them in his key using differences in fruit (smooth and chartaceous in *R. affinis* vs minutely pitted and fairly thick-walled in *R. dimorphandra*), seed length (1.4–1.5 mm vs 1.1–1.3 mm respectively) and aril shape (reaching the seed apex in *R. affinis* but not in *R. dimorphandra*). However, my seed measurements disagree, with similar measurements for *R. dimorphandra* and *R. affinis*, suggesting that previously



there had been few seeds available to measure and possibly not all of them mature. While all seeds examined of *R. affinis* had the aril reaching the apex, those of *R. dimorphandra* varied from having a shorter, fairly central aril, to a longer aril that reached the top of the seed. There also did not appear to be any difference in the fruit wall of the two taxa, but some difference in their habitat is likely since they are geographically separated.

One difference between the two species that has not been pointed out previously is that *R. affinis* has a minimum of three ovules per loculus whereas *R. dimorphandra* has a maximum of three ovules per loculus; this difference was hidden by the inaccurate ovule numbers (3–5 rather than 2 or 3) given for *R. dimorphandra* by Trudgen (1986a). All flowers of *R. affinis* examined in the current study had a maximum of five ovules per loculus, although up to seven ovules were recorded by Trudgen (1986a).

**11. *Rinzia communis*** Trudgen, *Nuytsia* 5: 435–436 (1986). *Type*: Mt Madden, south-east of Lake King, Western Australia, 29 July 1976, M.E. Trudgen 1700 (*holo*: PERTH 01631829; *iso*: CANB 367223, K 000821697, MEL 1552707, NSW 542177).

*Illustrations*. Drawings on C.A. Gardner s.n. Nov. 1931 (PERTH 05849128); M.E. Trudgen, *Nuytsia* 5: 419, Figure 2, top row on right (1986).

*Shrub* usually 0.1–0.3(–0.5) m high but rarely up to 1 m high, 0.2–1.2 m wide. *Petioles* 0.2–0.4 mm long. *Leaf blades* narrowly ovate to linear in outline, (1.5–)2–5.5 mm long, 0.4–0.8 mm wide, 0.5–0.9 mm thick, obtuse, entire. *Peduncles* 1-flowered. *Bracteoles* 0.7–1.4 mm long. *Pedicels* (1.5–)2–4(–5) mm long. *Flowers* 6–9.5 mm diam. *Hypanthium* 0.7–1 mm long. *Sepals* 0.7–1.2 mm long. *Petals* 2.5–4.5 mm long, white or pale pink. *Stamens* 10, connate for up to c. 0.8 mm. *Antipetalous filaments* 1.4–2.2 mm long, 0.6–1 mm wide. *Antisepalous filaments* 0.9–1.6 mm long, 0.3–0.6 mm wide. *Anthers* c. 0.4 mm long. *Ovules* 2 per loculus. *Style* 1.3–1.8 mm long. *Fruits* 1.6–2.3 mm long. *Seeds* 1.3–1.7 mm long, 0.6–0.7 mm wide, 0.8–1 mm thick, colliculate; aril central on inner surface, 0.6–1 mm long.

*Diagnostic features*. Distinguished from other members of sect. *Rinzia* by the following combination of characters: leaves petiolate, very thick; ovules 2 per loculus; seeds colliculate.

*Selected specimens examined*. WESTERNAUSTRALIA: Dam 541, S side of Newdegate–Lake King Rd, 22 Nov. 2006, A. Coates AC 5743 (PERTH); Lake King Nature Reserve, 16 Aug. 1995, M.S. Graham MSG 505 (PERTH); N side of track, 9.3 km NW of Mallee Rd junction, Dunn Rock Nature Reserve, 13 May 1999, G.J. Keighery & N. Gibson 3003 (PERTH); 30.3 km E of Lake Grace on road to Lake King, 18 Sep. 2007, B.L. Rye 279032 (PERTH); junction of Rollands Rd and Cascades Rd, NW of Esperance, 22 Oct. 1997, Peter G. Wilson 1425 & N. Lam (NSW, PERTH).

*Distribution and habitat*. Extends from Gnowangerup east to the Young River area and north-east to Frank Hann National Park, in varied soil types associated with hills or on plains, often in mallee vegetation. *Rinzia communis* overlaps in range with *R. affinis* and *R. sessilis* and extends to the edge of the ranges of *R. fumana* and *R. rubra*.

*Phenology*. Flowers and fruits from June to November.

*Conservation status*. This is the most commonly collected species of *Rinzia* in south-western Australia, and is not considered to be at risk.

*Etymology.* The epithet is Latin and means common; Trudgen (1986a: 436) considered this species to be ‘the most widespread and common species in the genus’. However, the Western Australian species *R. carnososa* is now known to have a greater range, and in the expanded genus, *R. orientalis* is the most widespread and commonly collected species.

*Common name.* Mallee Rinzia.

*Notes.* This species has been confused with *R. fumana* but differs in having its leaves furrowed on the abaxial surface, and in the filament characters used in the key. Most specimens of *R. fumana* also differ from *R. communis* in having a smooth, glossy coating on the seeds.

The specimen *Peter G. Wilson* 1437 & *E.A. Brown* appears to be a hybrid between *R. communis* and *R. affinis*. The putative hybrid has leaves of intermediate morphology; it matches *R. communis* in having 1-flowered peduncles and broad seeds, but the seeds are smooth as in *R. affinis* and there are three ovules per loculus, which means that it keys out with *R. affinis*. Another specimen may be a hybrid between *R. communis* and *R. sessilis* (see notes under the latter species).

Many specimens have short leaves densely 4-ranked on their branchlets but some, including those associated with granite outcrops, tend to have longer leaves that are not obviously 4-ranked.

An atypical variant from the Lake King area is known from ten specimens, three of which are cited above (*A. Coates* AC 5743; *M.S. Graham* MSG 505; *G.J. Keighery & N. Gibson* 3003). It has leaves that are abaxially grooved rather than convex as in the typical variant. It might also tend to have longer petioles and seeds than usual, but seed measurements are known only from one specimen.

**12. *Rinzia crassifolia*** Turcz., *Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Pétersbourg* 10: 331 (1852). *Type:* south-western Australia [Toodyay to Mullean area and to south coast], Western Australia, 1847–1849, *J. Drummond* coll. 5: 122 (*holo:* KW 001001295; *iso:* BM 001015090, K 000843242, MEL 76343, PERTH 01631845 & 01829505).

*Baeckea platystemona* Benth., *Fl. Austral.* 3: 74 (1867). *Hypocalymma platystemon* (Benth.) Nied., in H.G.A. Engler & K.A.E. Prantl, *Nat. Pflanzenfam.* 3(7): 99 (1893). *Type:* south-western Australia, 1847–1849, *J. Drummond* coll. 5: 122 (*lecto:* K 000843242, *fide* M.E. Trudgen, *Nyctisia* 5: 437 (1986); *isolecto:* BM 001015090, KW 001001295, MEL 76343, PERTH 01631845 & 01829505; south-western Australia [north of Moore River to King George Sound and West Mt Barren, Western Australia], 1844 or 1846–1847, *J. Drummond* coll. 4: 148 (*syn:* MEL 73910, PERTH 01631837).

*Rinzia* sp. Darling Range (F. Hort 2040); Western Australian Herbarium, in *FloraBase*, <https://florabase.dpaw.wa.gov.au/> [accessed 5 January 2016].

*Illustrations.* W.E. Blackall & B.J. Grieve, *How Know W. Austral. Wildfl.* 3A: 68 (1980) [as *Baeckea platystemona*]; M.E. Trudgen, *Nyctisia* 5: 419, Figure 2, bottom row on left (1986).

*Shrub* usually 0.1–0.3 m high, scrambling or prostrate. *Petioles* 0.2–0.4 mm long. *Leafblades* elliptic to linear in outline, 2–12 mm long, 0.5–1.8 mm wide, 0.2–0.7 mm thick, obtuse or acute, entire. *Peduncles* 1(2)-flowered. *Bracteoles* 1.6–3.8 mm long. *Pedicels* (2.5–)4–9 mm long. *Flowers* 7.5–13 mm diam. *Hypanthium* 0.7–1.5 mm long. *Sepals* 1.3–2.3 mm long. *Petals* 3–5 mm long, white to bright pink. *Stamens* 10, connate for 0.3–0.7 mm. *Antipetalous filaments* 1.2–2.2 mm long, 0.6–1.2 mm wide.

*Antisepalous filaments* 0.9–1.4 mm long, 0.3–0.6 mm wide. *Anthers* 0.35–0.5 mm long. *Ovules* 2 per loculus. *Style* 1.1–1.6 mm long. *Fruits* 2–3 mm long. *Seeds* 1.6–2 mm long, 0.7–0.8 mm wide, 0.9–1.1 mm thick, deeply colliculate or tuberculate; aril 0.9–1.2 mm long. (Figure 8)

*Diagnostic features.* Distinguished from other members of sect. *Rinzia*, by the following combination of characters: leaves petiolate, usually distinctly broader than thick; flowers 7.5–13 mm diam.; ovules 2 per loculus; seeds deeply colliculate or tuberculate.

*Selected specimens examined.* WESTERN AUSTRALIA: DEC Forest Block A47883 – Mercer Rd Rock, York, 5 Sep. 2008, *L. Gargett & H. Lancaster* CJ 21 (PERTH); Dale West Rd, Beverley, 13 Sep. 1999, *F. Hort* 580 (CANB, PERTH); Mercer Rd, 0.8 km W of Browns Rd, York, 8 Sep. 2003, *F. Hort* 2040 (BRI, PERTH); Bindoon Training Centre, 25 Aug. 2015, *F. Hort* 3942 (CANB, NSW, PERTH); Calingiri Water Reserve, Fordham Rd, c. 8.75 km SSE of Calingiri townsite, 27 Oct. 2004, *F. Hort & B. Hort* 2392 (PERTH); central Needling Hills, E of York, 4 July 2005, *A. Sole & H. Green* KB 21 (PERTH).

*Distribution and habitat.* Recorded from Watheroo south to the Darling Range near Perth and south-east to near Brookton, in heath vegetation on lateritic rises or on granite. *Rinzia crassifolia* extends further north than any other member of the section. At the southernmost part of its range, *R. crassifolia* overlaps slightly with the northernmost part of the range of *R. fumana*.

*Phenology.* Flowers and fruits from July to November.

*Conservation status.* *Rinzia crassifolia* is not considered to be at risk as it is known from many localities over a range of over 220 km, including populations protected in national parks or nature reserves.

*Etymology.* From the Latin *crassus* (thick) and *-folius* (-leaved) referring to the thick leaves of the type material.

*Common name.* Darling Range *Rinzia*.

*Notes.* *Rinzia crassifolia* is very similar to *R. fumana* in habit and leaf morphology and has the same ovule number. The latter differs in having shorter, smoother seeds, which are usually very glossy, and in having five to ten stamens.

As described above, this taxon is particularly variable in its leaf morphology. Type material is at one extreme of the range of variation, having very short, thick leaves (2–3.5 mm long, 1.3–1.8 mm wide, 0.4–0.7 mm thick), hence the name *crassifolia*. In February 2009, the phrase name *R. sp.* Darling Range (*F. Hort* 2040) was applied to specimens from the Perth Region with longer (5–12 mm long), flatter leaves that tended also to be narrower (0.5–1.6 mm wide). However, some collections made since then have leaf measurements down to 4 mm long, and a recent collection from the Bindoon area (*F. Hort* 3942) has leaves down to 3.5 mm long, bridging the gap in leaf length that had originally been used to separate *R. sp.* Darling Range from *R. crassifolia*. In view of the paucity of material of the typical entity and the large degree of variability in the material housed as *R. sp.* Darling Range, it appears that the observed differences in their leaves are insufficient to treat them as separate species.

No details are known of the habit, locality, habitat or flowering time for the typical variant of *R. crassifolia*. The two collections of it were made by James Drummond on his fourth and fifth



Figure 8. *Rinzia crassifolia*, top view of flowers. Image taken by Jean Hort at Julimar Conservation Park; voucher *J. & F. Hort* 3664.

collecting expeditions. These two expeditions (see Erickson 1969) covered a lot of common ground between Toodyay and King George Sound and from the Stirling Range east to West Mt Barren. If the two early collections of *R. crassifolia* were made towards the northern end of the main route used at that time between the York–Toodyay area and Albany, which those two expeditions traversed, they could have been made within or adjacent to the distribution of the longer-leaved variant that has been known as *R. sp.* Darling Range.

Other characters showing great variability are flower size and colour, and the degree to which the stamens are united. A large-flowered specimen is illustrated in Figure 8. Descriptions of *R. crassifolia* given in Trudgen (1986a) and Rye (1987) are based primarily on the atypical material.

According to Trudgen (1986a: 438) ‘Occasional plants are 6-merous, their flowers having 6 petals, 6 calyx lobes, 12 stamens and 4 ovary loculi’. No such plants were observed in the current study of PERTH specimens. It seems likely that occasional flowers on typically 5-merous plants are 6-merous, as often happens elsewhere in the tribe, for example in *Astartea* DC. (Rye 2013: 194). A few flowers with only eight or nine fertile stamens were observed in the current study, with one or two of the antiseipalous stamens absent or reduced to staminodes.

**13. *Rinzia dimorphandra*** (F. Muell. ex Benth.) Trudgen, *Nuytsia* 5: 430 (1986). *Baeckea dimorphandra* F. Muell. ex Benth., *Fl. Austral.* 3: 74 (1867). *Hypocalymma dimorphandrum* (F. Muell. ex Benth.) Nied., in H.G.A. Engler & K.A.E. Prantl, *Nat. Pflanzenfam.* 3(7): 99 (1893). *Type*: sandy places near Cape le Grand, Western Australia, 1858–1866, *G. Maxwell s.n. (holo: MEL 72717; iso: MEL 72718)*.

*Illustrations*. W.E. Blackall & B.J. Grieve, *How Know W. Austral. Wildfl.* 3A: 69 (1980) [as *Baeckea dimorphandra*]; M.E. Trudgen, *Nuytsia* 5: 419, Figure 2, second row on left (1986).

*Shrub* c. 0.2–(0.5) m, with adventitious roots from prostrate main stems. *Petioles* 0.2–0.4 mm long. *Leaf blades* narrowly elliptic to elliptic or narrowly obovate in outline, 2–4.5 mm long, 0.5–0.8 mm wide, 0.5–0.7 mm thick, acute to obtuse, entire. *Peduncles* (1)2-flowered; secondary axes  $\pm$  absent. *Bracteoles* 0.8–2.2 mm long. *Pedicels* 1–3 mm long. *Flowers* 7.5–10 mm diam. *Hypanthium* 1–1.4 mm long. *Sepals* 1–1.5 mm long. *Petals* 3–4 mm long, bright pink or rarely pale pink to white. *Stamens* 10, connate for up to 0.25 mm. *Antipetalous filaments* 1.2–1.6 mm long, 0.6–0.9 mm wide. *Antisepalous filaments* 0.7–1 mm long, 0.3–0.5 mm wide. *Anthers* 0.3–0.5 mm long. *Ovules* (2)3, never 2 in all loculi. *Style* 1.3–1.8 mm long. *Fruits* 1.7–2 mm long. *Seeds* 1.3–1.5 mm long, 0.4–0.55 mm wide, 0.55–0.7 mm thick, smooth; aril 0.7–1 mm long, fairly central or reaching to the apex of the seed.

*Diagnostic features*. Distinguished from all other members of the genus except *R. affinis* by the following combination of characters: peduncles usually 2-flowered; ovules 2 or 3 (never all 2) per loculus; seeds smooth, arillate. Distinguished from *R. affinis* by minor characters including its usually more deeply pink petals.

*Selected specimens examined*. WESTERN AUSTRALIA: Old Smokey Rd, Esperance, 3 Oct. 1995, *R.J. Cranfield* 10396 (PERTH); High Island, Duke of Orleans Bay, 20 Oct. 1985, *E. & S. Pignatti* 1233 (PERTH); Speddingup (E), c. 40–50 km N of Esperance, 9 Sep. 1997, *C.D. Turley* 4/997 (PERTH); Old Smokey Rd, near Fisheries Rd, NE of Esperance, 19 Oct. 1997, *Peter G. Wilson* 1408 & *N. Lam* (NSW, PERTH).

*Distribution and habitat*. Extends from Speddingup east to near Howick Hill, in sand, sometimes with limestone, often in *Banksia* scrub. *Rinzia dimorphandra* is geographically disjunct from most other members of sect. *Rinzia*, occurring further east than all of them except for an outlying locality of *R. sessilis*, which occurs even further east.

*Phenology*. Flowers from September to December. Mature fruits are recorded from November to January.

*Conservation status*. Not currently considered to be at risk, this species has a distribution c. 100 km long.

*Etymology*. From the Greek *dimorphos* (having two forms) and *-andrus* (-stamened), as the antipetalous stamens are much larger than the antisepalous stamens.

*Common name*. Esperance *Rinzia*.

*Notes*. This species is very similar to *R. affinis*; for the differences between the two species, see the notes under *R. affinis*. Chloroplast and ETS data (Peter Wilson pers. comm.) give different placements of this species, the former including it in sect. *Rinzia* and the latter placing it as a strongly supported sister to sect. *Discolora*. If future molecular studies establish that this species needs to be transferred to sect. *Discolora*, or placed in its own section, then at least one other species, *R. affinis* would

presumably need to be moved as well. However, since *R. affinis* is suspected of hybridising with *R. communis* of sect. *Rinzia*, the decision has been made here to give more weight to the chloroplast data and morphology, and to retain both species in sect. *Rinzia*.

According to Trudgen (1986a: 430), *R. dimorphandra* has three to five ovules per loculus but the ovule number is recorded as two or three per loculus in Blackall and Grieve (1980: 69). The current study concurs with Blackall and Grieve, recording a maximum of three ovules per loculus and occasionally only two ovules in one or two of the loculi. Seeds were found to be larger, 1.3–1.5 mm long, than the 1.1–1.3 mm recorded by Trudgen (1986a), and the aril is not always central in location as indicated in that revision.

**14. *Rinzia fumana*** Schauer, *Linnaea* 17: 239–240 (1843). *Baeckea fumana* (Schauer) F.Muell., *Fragm.* 4: 68 (1864). *Hypocalymma fumanum* (Schauer) Nied., in H.G.A. Engler & K.A.E. Prantl, *Nat. Pflanzenfam.* 3(7): 99 (1893). *Type*: inland from King George Sound, Western Australia, Oct. 1840, J.A.L. Preiss 164 (*syn*: LD 1088555, MEL 72748).

*Illustrations*. W.E. Blackall & B.J. Grieve, *How Know W. Austral. Wildfl.* 3A: 68 (1980) [as *Baeckea fumana*]; M.E. Trudgen, *Nuytsia* 5: 419, Figure 2, second row in middle (1986).

*Shrub* usually 0.1–0.3 m high, prostrate or low and widely spreading. *Petioles* 0.2–0.4 mm long. *Leaf blades* narrowly elliptic to linear in outline, 2.5–8 mm long, 0.5–1 mm wide, 0.3–0.6 mm thick, acute to obtuse, often denticulate around the apex. *Peduncles* mostly 1-flowered. *Bracteoles* 1–1.6 mm long, entire or denticulate. *Pedicels* 1.5–5.5 mm long. *Flowers* 5.5–8 mm diam. *Hypanthium* 0.6–1 mm long. *Sepals* 1–1.6 mm long. *Petals* 2.3–3.5 mm long, pink or white. *Stamens* 5–10, connate for up to 0.5 mm, free (but contiguous) when 5. *Antipetalous filaments* 0.9–1.5 mm long, 0.6–1 mm wide. *Antisepalous filaments* (when present) 0.6–1 mm long, 0.3–0.5 mm wide. *Anthers* c. 0.3 mm long. *Ovules* 2 per loculus. *Style* 0.6–1.1 mm long. *Fruits* 1.5–1.8 mm long. *Seeds* 1.3–1.5 mm long, 0.5–0.6 mm wide, 0.6–0.8 mm thick, smooth or colliculate, usually very glossy, somewhat beaked adjacent to both ends of aril; aril 0.5–0.6 mm long.

*Diagnostic features*. Distinguished from other members of sect. *Rinzia* by the following combination of characters: leaves petiolate, usually distinctly broader than thick; flowers 5.5–8 mm diam.; antipetalous filaments often 2-horned, terminating in a white band of papillae; ovules 2 per loculus, style 0.6–1.1 mm long; seeds smooth or colliculate, usually glossy.

*Selected specimens examined*. WESTERN AUSTRALIA: near Kalgan River, NE of Albany, Oct. 1903, C.R.P. Andrews s.n. (PERTH); 18 km ENE of Rocky Gully on western edge of reserve 26586, 20 Oct. 1995, A.R. Annels 5492 & T.D. Macfarlane (CANB, MJP, PERTH); Woogenilup, 18 Oct. 1962, T.E.H. Aplin 2118 (PERTH); 10 km S [of Brookton Hwy] along Watershed Rd, 19 Nov. 1981, R.J. Cranfield 1968 (PERTH); Monadnocks Conservation Reserve, Pike Rd, Wandering, 1.5 km E from Watershed Rd, 2 Nov. 2009, F. Hort 3520 (PERTH); Kamballup Golf Course, intersection of Woogenilup and Chester Pass Rd, 25 Oct. 1985, N. Hoyle 1308 (PERTH); Geekabee Hill, W of Cranbrook, 25 Oct. 1997, N. Lam, Peter G. Wilson & E.A. Brown UNSW 23742 (UNSW); Newell Rd, SW of Gura Rd pine plantation, Dryandra State Forest, 14 Sep. 1988, D. Rose 796 (PERTH); hilltop S of Brookton Hwy, 1.3 km W of Warradale Rd, Darling Range, 9 Sep. 2007, B.L. Rye 279015, M.C. Motsi, F. Hort & J. Hort (AD, PERTH); Metro Rd, S of Brookton Hwy, 18 Oct. 2010, K.R. Thiele 3886 (PERTH).

*Distribution and habitat*. Extends from the central part of the Darling Range south to Collie and south-west to near the upper Kalgan River. Occurs on granite outcrops in the far north of its range

but elsewhere occurs mainly on lateritic soils, commonly in Wandoo or Jarrah woodland or with other eucalypts dominant. *Rinzia fumana* overlaps slightly in the north with *R. crassifolia* and slightly in the east with *R. communis*, but is well separated from the other members of sect. *Rinzia*.

*Phenology.* Flowers and mature fruits recorded from July to November.

*Conservation status.* This taxon is fairly widespread, with a broad range extending for at least 260 km, and is not considered to be under threat.

*Etymology.* *Rinzia fumana* is possibly so-named because of its two distinct types of stamens, with antipetalous ones much larger than antisealous ones, as the genus *Fumana* (Dunal) Spach of the family Cistaceae also has two kinds of androecial members, in that case staminodes and stamens.

*Common name.* Polished *Rinzia*. The common name refers to the very glossy coating on the seeds, which makes them very smooth. In a few cases the coating can be seen peeling off (e.g. on seeds in *R. Davis* 8753), revealing a dull, colliculate surface below.

*Typification.* A lectotype is not designated at this time since I may not have viewed all of the material available to Schauer. It is of note that LD 1088555 appears to bear Schauer's annotation.

*Notes.* This species has been confused with both of the species, *R. crassifolia* and *R. communis*, with which it overlaps in distribution. All three species have two ovules per loculus but *R. communis* differs from *R. fumana* in having thicker leaves, while *R. crassifolia* differs in having tuberculate seeds.

*Rinzia fumana* has, on average, the fewest stamens and shortest style in sect. *Rinzia*. Throughout the species' geographic range, stamen number varies from five to ten, with a majority of flowers having less than ten stamens.

The northernmost specimens of *R. fumana* (e.g. *K.R. Thiele* 3886) occur mainly on granite outcrops, whereas throughout the remainder of the range most specimens are recorded from lateritic sites. The largest flowers (c. 8 mm diam.) have been recorded from the northern area but all specimens have short styles.

The south-easternmost specimens (e.g. *A. Morrison s.n.* (PERTH 05886090); *N. Hoyle* 1308), from the Stirling Range and south of the Stirling Range, include the largest leaves, up to 8 mm long, and have seeds that are more obviously colliculate than usual, but this variant is too poorly known to be sure how distinctive it is.

*Rinzia fumana* commonly produces mature seeds from all or a majority of its six ovules, and seeds are present on a large proportion of the specimens. Trudgen (1986a) recorded seed length as 1.1–1.4 mm but larger measurements, of 1.3–1.5 mm, were obtained here.

**15. *Rinzia rubra*** Trudgen, *Nuytsia* 5: 427–430 (1986). *Type:* on Lake King to Salmon Gums road, Western Australia [precise locality withheld for conservation reasons], 3 November 1976, *M.E. Trudgen* 1765 (*holo:* PERTH 01631853; *iso:* CANB 367222, K 000821743, MEL 1552705, NSW 547595).

*Illustration.* M.E. Trudgen, *Nuytsia* 5: 419, Figure 2, third row at centre (1986).

*Shrub* 0.05–0.7(–1) m high. *Petioles* 0.2–0.4 mm long. *Leaf blades* usually narrowly oblong to narrowly obovate in outline, 1.5–4 mm long, 0.6–1 mm wide, 0.4–0.6 mm thick, obtuse, entire. *Peduncles* 1-flowered. *Bracteoles* 1.2–1.5 mm long. *Pedicels* 2.5–5 mm long. *Flowers* c. 9 mm diam. *Hypanthium* 1.7–2.1 mm long. *Sepals* 1–1.5 mm long. *Petals* c. 3 mm long, white. *Stamens* 10, connate for 0.6–1 mm. *Antipetalous filaments* 1.7–2 mm long, 0.6–0.8 mm wide. *Antisepalous filaments* 1.2–1.5 mm long, 0.4–0.5 mm wide. *Anthers* c. 0.4 mm long. *Ovules* 5–9 per loculus. *Style* 2–2.5 mm long. *Fruits* 2.6–3 mm long. *Seeds* 1.6–1.7 mm long, c. 0.8 mm wide, 0.8–1 mm thick, very minutely tuberculate; aril rudimentary or absent.

*Diagnostic features.* Distinguished from other members of sect. *Rinzia* in lacking an obvious aril on its seeds. Other important characters are: anther loculi protruding beyond apex of filament; ovules 5–9 per loculus; seeds minutely tuberculate.

*Selected specimen examined.* WESTERN AUSTRALIA: [locality withheld for conservation reasons] 18 Sep. 1986, R.J. Hnatiuk 760891 (PERTH).

*Distribution and habitat.* Occurs in Frank Hann National Park and Bremer Range, in sandy soils with vegetation dominated by *Eucalyptus* mallee scrublands or woodlands. *Rinzia rubra* occupies a small area within the ranges of *R. communis* and *R. sessilis*.

An inaccurate distribution was given for *R. rubra* in Trudgen (1986a), partly as a result of the inclusion of specimens (*E. M. Canning* W.A./68-2526 (CBG n.v.); *K. R. Newbey* 5838) of *R. fimbriolata*, although only one of these was apparently mapped. A second reason for the map being wrong was an incorrect locality on the correctly identified specimen *K. R. Newbey* 5576. That specimen has the locality given as ‘20 km south west of Coolgardie’ (see Trudgen 1986a) but is now known to have been collected in the Bremer Range area.

*Phenology.* Flowers from July to November, with mature fruits recorded in early November.

*Conservation status.* Recently listed as Priority Two under Department of Parks and Wildlife Conservation Codes for Western Australian Flora (Western Australian Herbarium 1998–). *Rinzia rubra* is restricted in its distribution, with a known range less than 25 km long, but occurs in a large national park. It is known from only four collections, the most recent in 1986, including the only collection (*R. J. Hnatiuk* 760891) cited above, which was not given by Trudgen (1986a).

*Etymology.* From the Latin *ruber* (ruddy, red) referring to the dull reddish colour on the hypanthium and sepals.

*Common name.* Red-based *Rinzia*. The hypanthium of *R. rubra* is broader at the base, and more obviously reddish, than in other members of section *Rinzia*.

*Notes.* This is a very distinctive species, differing from all other members of sect. *Rinzia* in its aril being vestigial or absent. Its ovule numbers are the highest on average for the section, up to nine per loculus. According to the protologue there can be as few as four ovules, but that may be incorrect as specimens of *R. fimbriolata* (which has 3–5 ovules per loculus) were previously included in the description. However, the protologue does not appear to have included any other characters that could be exclusive to *R. fimbriolata*.



*Rinzia rubra* seems to be more erect than most species of sect. *Rinzia* and is apparently able to regenerate from a thick rootstock after fires.

**16. *Rinzia sessilis*** Trudgen, *Nuytsia* 5: 436–437 (1986). *Type*: 10 km north of Lake Cronin, c. 84 km E of Hyden, Western Australia, 13 September 1981, *K.R. Newbey* 8798 (*holo*: PERTH 01631888; *iso*: CANB 367221, K 000821742, MEL 1552706, NSW 542204, PERTH 01631896).

*Illustration*. M.E. Trudgen, *Nuytsia* 5: 417, Figure 1 (1986).

*Shrub* 0.2–0.5(–0.8) m high, with main stems prostrate and shorter branches erect. *Leaves* sessile, oblong to almost circular or narrowly ovate in outline, 0.8–3.5 mm long, 0.4–0.8 mm wide, 0.4–0.6 mm thick, usually obtuse, glabrous or ciliate, sometimes with tangled white hairs up to 0.5 mm long. *Peduncles* 1-flowered. *Bracteoles* 0.8–1.7 mm long. *Pedicels* 0.6–2.2 mm long. *Flowers* 5–9 mm diam. *Hypanthium* 0.8–1 mm long. *Sepals* 0.6–1.2 mm long, sometimes ciliate. *Petals* 2–3.5 mm long, usually pale pink. *Stamens* 10, connate for 0.4–0.8 mm. *Antipetalous filaments* 1.2–1.7 mm long, 0.5–0.9 mm wide. *Antisepalous filaments* 0.7–1.2 mm long, 0.3–0.5 mm wide. *Anthers* 0.3–0.4 mm long. *Ovules* 2 per loculus. *Style* 0.9–2 mm long. *Fruits* 1.7–2.3 mm long. *Seeds* 1.35–1.7 mm long, 0.6–0.85 mm wide, 0.7–1 mm thick, colliculate; aril 0.55–0.7 mm long.

*Diagnostic features*. Distinguished from other members of sect. *Rinzia* by its sessile leaves and the white hairs (when present) on its leaf margins and sepals. Other important characters are: ovules 2 per loculus; seeds colliculate.

*Selected specimens examined*. WESTERN AUSTRALIA: Oldfield 1343 [28 km NW of Cascade], 24 May 1993, *R. Bruhn* 3/24593 (PERTH); S of Jilakin Rocks Rd, W boundary of Dragon Rocks Nature Reserve, 11 Oct. 1991, *A.M. Coates* 3209 B (BRI, PERTH); c. 3 km SSE of Tamar Hill, Bremer Range, 15 Sep. 1994, *N. Gibson & M. Lyons* 1767 (AD, PERTH); c. 6.27 km S of Mt Holland, 26 Sep. 2009, *W.A. Thompson & J. Allen* 1294 (PERTH); 84.5 km W of Peak Charles turnoff on Lake King Rd, Frank Hann National Park, Roe District, 16 Oct. 1997, *Peter G. Wilson* 1395 & *N. Lam* (NSW, PERTH).

*Distribution and habitat*. Extends from north-west of Mt Holland south-east to near Pyramid Lake, with an isolated collection more than 200 km further east at Ponier Rock (*K.R. Newbey* 7323). The majority of the known localities are within the Coolgardie bioregion of the Eremaean Botanical Province, with the remainder in adjacent parts of the South West Botanical Province. Occurs in varied habitats including sandy soils near salt lakes, and elevated laterite.

*Phenology*. Flowers mainly from July to October. Mature fruits are recorded in September and October.

*Conservation status*. The main range of this species is more than 225 km long, but including the outlying eastern occurrence increases the overall distribution to over 450 km. It is not considered to be under threat.

*Etymology*. The epithet refers to the sessile leaves.

*Common name*. Sessile-leaved *Rinzia*.

*Notes*. This is the only species of sect. *Rinzia* with uniformly sessile leaves and the only one that sometimes has an obvious border of white cilia on the leaf margins, giving it a very distinctive

appearance. All specimens collected west of longitude 120° E have more or less glabrous, entire leaves, whereas those collected east of 120° have leaves varying from sparsely ciliolate to densely ciliate. Bracteoles and sepals have similar margins to the young leaves of each specimen, i.e. being densely ciliate if the leaves are densely ciliate.

One atypical specimen from Frank Hann National Park, *D. Butcher* 323, is possibly a hybrid between *R. sessilis* and *R. communis*. This specimen has leaves that are petiolate like those of *R. communis* but with white hairs on the margin like those of *R. sessilis* in that area. *Rinzia sessilis* also overlaps in range with *R. rubra*.

*Rinzia sessilis* occasionally has the anther loculi protruding above the apex of the filament; in this respect it may be intermediate between *R. rubra* and the other members of sect. *Rinzia*.

**Rinzia** sect. **Semasperma** Rye, *sect. nov.*

*Typus*: *Rinzia orientalis* Rye.

‘*Semasperma*’ ms in B.L. Rye, *Nuytsia* 19: 320 (2009).

Mat-like to erect *shrubs* up to 1.3 m high, sometimes rooting adventitiously from horizontal stems. *Leaves* concolorous. *Peduncles* up to 0.3 mm long, 1-flowered. *Pedicels* ± absent or up to 5 mm long. *Sepals* brown to very dark red with a broad, petaline or scarious margin. *Petals* white or pale pink. *Stamens* 5–20, when 5 all antipetalous, when more numerous then either ± equidistant or in antipetalous triads. *Filaments* usually free, rarely in shortly connate triads, ± terete, < 0.2 mm wide; apex below top of anther. *Anthers* versatile. *Ovary* 1/2–3/4-inferior; summit convex; ovules 2 per loculus. *Style* 0.8–1.8 mm long; stigma capitate or peltate. *Fruits* fairly erect, c. 1/2-inferior or largely superior. *Seeds* 1.1–1.5 mm long, brown, minutely colliculate; inner surface with a large whitish cavity divided longitudinally into three parts by two ridges and surrounded by a narrow raised rim, the ridges very stiff.

*Diagnostic features.* Distinguished from other sections of *Rinzia* by its seed morphology, having a large cavity on the inner surface that is divided into three sections by two longitudinal partitions. Other important characters are the narrow filaments, versatile anthers and 2 ovules per loculus.

*Distribution and phenology.* This is the only section to occur both in south-western and south-eastern Australia (Figure 3). There is a large disjunction between the single Western Australian species and the two eastern ones, with flowering appearing to be more seasonal in the east.

*Etymology.* From the Greek *sema* (sign, mark) and *sperma* (seed) in reference to the distinctive, large cavity on the inner surface of the seeds.

*Notes.* The inclusion of *R. icosandra* in sect. *Semasperma* is based on its morphology and is supported by unpublished ETS data (see ‘Molecular studies’ section). Published studies based on chloroplast molecular data (Lam *et al.* 2002; Wilson *et al.* 2004), however, place it as the sister to section *Rinzia*.

The ridges within the whitish cavity on the inner surface of the seed have the appearance of an elaiosome, but are much harder than the remainder of the seed and therefore seem to have a structural rather than a nutritional function.

**17. *Rinzia ericaea*** (F.Muell. ex Benth.) Rye, *comb. nov.*

*Baeckea ericaea* F.Muell. ex Benth., *Fl. Austral.* 3: 77 (1867). *Type*: Murray [Murray River], scrub, Victoria, 1854, *F. Mueller s.n.* (lecto: MEL 72733, here designated; ?*isolecto*: MEL 72734); Wimmera [Wimmera River], Victoria, *J. Dallachy s.n.* (*syn*: K 000843224, MEL 72735, NSW 123001).

*Illustrations*. J.P. Jessop & H.R. Toelken (eds), *Fl. S. Austral.* (5<sup>th</sup> edn) 2: 894, Figure 462C (1986); G. Walsh & T.J. Entwisle (eds), *Fl. Victoria* 3: 1037, Figure 214C (1996) [both as *Baeckea ericaea*]; drawing on *H.H.D. Griffith s.n.* (AD 96828146).

*Shrub* up to 0.3 m high but usually low and mat-like, sometimes rooting adventitiously from horizontal stems; flowering branchlets with 1 or 2 pairs of flowers at or close to the end. *Leaves* appressed or antrorse and up to c. 3 mm long on fast-growing shoots, antrorse to patent on lateral branchlets. *Foliar colleters* visible on very young leaves. *Petioles* 0.1–0.3 mm long. *Leaf blades* narrowly ovate to narrowly oblong in outline, 1.3–3.2 mm long, 0.4–0.8 mm wide, 0.3–0.5 mm thick, obtuse, ciliate; adaxial surface flat or slightly convex; abaxial surface deeply convex or somewhat angular; oil glands in 1 main row on each side of midvein. *Peduncles* ± absent. *Bracteoles* persistent, cordate, 0.8–1.4 mm long, about as wide as long, herbaceous, acute or somewhat acuminate, keeled, entire or denticulate. *Flowers* 4–6 mm diam. *Hypanthium* 0.8–1.2 mm long, c. 2 mm diam.; free part 0.3–0.5 mm long. *Sepals* depressed-elliptic to depressed-oblong or depressed-ovate, 0.8–1.3 mm long, 1.2–1.8 mm wide, with midrib usually forming a whitish low ridge, which sometimes branches distally, denticulate to ciliate-laciniate, brown or red-brown with a pale margin 0.2–0.4 mm wide; auricles (of outer sepals) up to 0.35 mm wide. *Petals* 1.4–2 mm long, white. *Stamens* usually 15 in close groups of 3 opposite the petals, with none opposite the sepals, usually with very little separation on each side to the adjacent short stamens, sometimes contiguous with and rarely united at base to an adjacent stamen. *Triads* with central filament 0.5–0.8 mm long and marginal filaments 0.3–0.6 mm long. *Anthers* 0.25–0.35 mm long. *Ovary* c. 1/2–2/3-inferior. *Style* 0.8–1.2 mm long; stigma 0.15–0.2 mm diam. *Fruits* with petals and stamens usually persistent, c. 1/2-inferior or largely superior, 1.4–1.5 mm long, 1.7–2.5 mm diam. *Seeds* 1.1–1.3 mm long, 0.5–0.7 mm wide, 0.6–0.7 mm thick, golden-brown; inner cavity central or slightly above the centre, 0.5–0.6 mm long, about as wide as long.

*Diagnostic features*. Distinguished from other members of sect. *Semasperma* by its persistent bracteoles, ± sessile flowers, and constant stamen number of 15 (in antipetalous triads).

*Distribution and habitat*. Occurs from near the Coorong area of South Australia east to the Big and Little Deserts of far-western Victoria, with a disjunct western occurrence on Kangaroo Island in South Australia (Figure 9A).

*Etymology*. From the Latin *erica* (heath).

*Common name*. Mat Heath-myrtle.

*Typification*. Two type specimens from MEL are known to have been examined by Bentham (as indicated by the letter B written on a down-turned corner of their labels), one from ‘Murray scrub’ collected by Mueller (MEL 72733) and the other from the Victorian Wimmera district by Dallachy (MEL 72735); both are labelled ‘*Baeckea ericaea* Ferd. Mueller’. A third specimen (MEL 72734), presumed to be part of Mueller’s Murray scrub collection, lacks any indication that Bentham saw it and is labelled ‘*Schidiomyrtus ericaea*’. All three specimens are in flower and are of similar quality. The *Mueller s.n.* (MEL 72733) specimen known to have been seen by Bentham is selected as the lectotype.

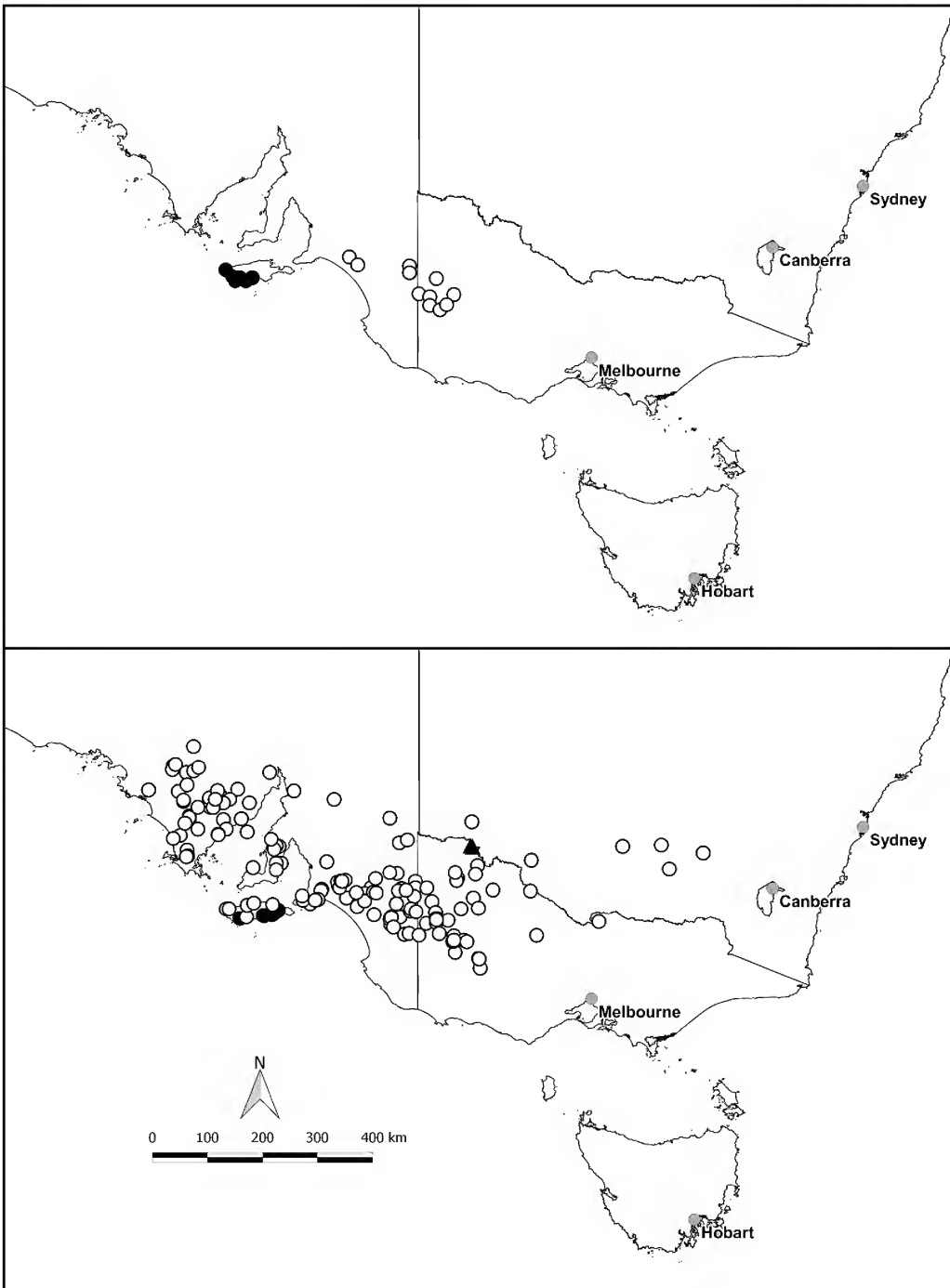


Figure 9. Distributions of the south-eastern Australian species of *Rinzia*. A – *R. ericaea* subsp. *ericaea* (○) and *R. ericaea* subsp. *insularis* (●); B – *R. orientalis* specimens with mostly 10 stamens (○), specimens with mostly 5–7 stamens (●) and specimens with up to 13 stamens (▲).

*Notes.* This species was first treated as a variant of *Baeckea microphylla* Sieber ex Spreng (Mueller 1858: 31) in a note indicating that specimens of *B. micrantha* with 15 stamens had previously been distributed either as *B. ericaea* F.Muell. ms or *Schidiomyrtus ericaea* F.Muell. ms. Benthams (1867) referred to this paper when he took up Mueller's manuscript name, stating 'closely resembling the smaller specimens of *Micromyrtus microphylla*, but quite different in the structure of the flowers'. *Baeckea microphylla* [= *M. microphylla* (Sieber ex Spreng.) Benth.], now known as *Micromyrtus ciliata* (Sm.) Druce, has only five stamens and bears only a superficial resemblance to *R. ericaea*.

*Rinzia ericaea* has the smallest flowers in the genus, with petals 1.4–2 mm long. It has a number of unique characters that make it very easy to identify, including its more or less sessile flowers with the hypanthium largely adnate to the ovary. The sepals sometimes have white venation comprising a single lateral vein on each side of an obvious midvein, which often protrudes from the flat summit of the flower buds. The bracteoles and petals persist in fruit.

Two geographically separated subspecies are recognised, occurring on the mainland and Kangaroo Island respectively. *Rinzia ericaea* was previously described briefly in Trudgen (1986) and Jeanes (1996) but without the Kangaroo Island specimens treated separately.

### Key to subspecies

1. Leaves often < 1.7 mm long, usually 0.4–0.5 mm thick (rarely down to 0.35 mm thick when only very short leaves 1.3–1.7 mm long are present), antrorse or widely antrorse on lateral branchlets (the branchlets of varied sizes including some 10–20 mm long), mostly appressed or antrorse elsewhere. Sepals with the midvein obvious and often also the lateral veins clearly visible (Coorong area, S.A.–Big & Little Deserts, Vic.)..... **17a. *R. ericaea* subsp. *ericaea***
- 1: Leaves 1.7–3.2 mm long, 0.3–0.4 mm thick, mostly widely antrorse to patent on numerous patent lateral branchlets (the branchlets 4–8 mm long), those on fast-growing shoots (when present) appressed or antrorse. Sepals often with the midvein not very obvious or very short, the lateral veins not visible or very obscure (Kangaroo Island, SA)..... **17b. *R. ericaea* subsp. *insularis***

### 17a. *Rinzia ericaea* (F.Muell.) Rye subsp. *ericaea*

*Shrub* either low and mat-like or erect and up to 0.3 m high, sometimes rooting adventitiously from horizontal stems; lateral branchlets patent or antrorse, including some 10–20 mm long. *Leaves* appressed or antrorse and up to c. 3 mm long on fast-growing shoots, antrorse or widely antrorse where crowded on lateral branchlets, sometimes with the keel protruding slightly beyond the apex of the leaf. *Leaf blades* narrowly ovate to narrowly oblong in outline, mostly 1.3–1.7 mm long, 0.4–0.8 mm wide, (0.35–)0.4–0.5 mm thick, margins ciliolate. *Sepals* with midvein always obvious; lateral veins often visible. *Antipetalous filaments* slender, usually with very little separation on each side to the adjacent short stamens, sometimes contiguous with, and rarely united at base to, an adjacent stamen.

*Selected specimens examined.* SOUTH AUSTRALIA: between Western Flat and Bordertown, 14 Oct. 1961, *D. Hunt* 212 (AD); c. 24 km NE of Keith, 23 Aug. 1961, *Paul G. Wilson* 1913 (AD). VICTORIA: Wyperfeld National Park, SW corner of Western Sector near dozed track, 8 Oct. 1968, *A.C. Beauglehole* 29095a & *E.W. Finck* (MEL); central Little Desert National Park, NE of Goroke Post

Office, Wimmera study area, 5 Sep. 1986, *A.C. Beauglehole* 83752 (PERTH); Little Desert, beyond salt lake from Kiala, 17 Oct. 1963, *M.E. Phillips s.n.* (CBG, NSW).

*Distribution and habitat.* Extends from near the Coorong area in south-eastern South Australia east to the Big and Little Deserts of far-western Victoria (Figure 9A), mostly occurring in sandy soils on dunes and in dry heathlands.

*Phenology.* Flowers from August to November.

*Conservation status.* This subspecies is widespread and relatively common, and is not considered to be under threat.

*Notes.* This subspecies has been recorded growing with *R. orientalis* (see notes under that species). It usually has shorter leaves than subsp. *insularis*, but on rapidly growing shoots the leaves tend to be just as long (see notes under subsp. *insularis*).

**17b. *Rinzia ericaea* subsp. *insularis* Rye, *subsp. nov.***

*Typus:* 1 mile [1.6 km] from Remarkable Rocks, Flinders Chase, Kangaroo Island, South Australia, 29 September 1965, *M.E. Phillips s.n.* (*holo:* AD 96807607; *iso:* CBG 020868).

*Shrub* < 0.3 m or rarely up to 0.6 m high, usually prostrate or low and mat-like, single-stemmed at the base, densely branched above, with many short, patent lateral branchlets 4–8 mm long. *Leaves* mostly widely antrorse to patent and densely arranged on the lateral branchlets, but those on fast-growing shoots (when present) appressed or antrorse, 1.7–3.2 mm long, 0.4–0.6 mm wide, 0.3–0.4 mm thick. *Sepals* with midvein visible but not always obvious; lateral veins invisible or very obscure. *Antipetalous filaments* free, with a distinct or slight separation on each side to the adjacent short stamens.

*Diagnostic features.* Distinguished from the other subspecies by its less thickened, usually longer leaves and its different overall appearance, with many short lateral branchlets perpendicular to the main stems and with the leaves very densely arranged and widely antrorse to patent. It can usually also be distinguished by its sepals having less obvious venation, with lateral veins not or scarcely visible.

*Other specimens examined.* SOUTH AUSTRALIA: near Kelly Hill Caves, SW part of Kangaroo Island, 5 Nov. 1958, *H. Eichler* 15221 (AD); immediately S of Mt Stockdale, Kangaroo Island, 3 Jan. 1966, *H. Eichler* 18570 (AD); mouth of Stunsail River, Kangaroo Island, 28 Nov. 1971, *G. Jackson* 899 (AD); Kangaroo Island, Oct. 1908, *H.H.D. Griffith s.n.* (AD); 5 mile [8 km] from Rocky River, Western Highway, Kangaroo Island, 27 Sep. 1965, *M.E. Phillips* SA/65 859 (CBG); Ravine de Casaar, Kangaroo Island, 1 Mar. 1886, *O. Tepper* 101 (AD, MEL); Karutha road to Mt Ingles, Kangaroo Island, 12/13 Nov. 1886, *O. Tepper* 35 (AD, MEL); head of Cygnet to Karutha, Kangaroo Island, 4 Mar. 1886, *O. Tepper* 47 (MEL).

*Distribution and habitat.* Endemic to Kangaroo Island, South Australia (Figure 9A), recorded in sandy soil, sometimes or always over limestone, in scrub.

*Phenology.* Flowers and mature fruits mainly from September to November, with one flower also observed (on *H. Eichler* 18570) in early January.

*Conservation status.* This taxon is geographically restricted and its conservation status has yet to be assessed.

*Etymology.* The epithet is Latin and means pertaining to islands, a reference to its distribution on Kangaroo Island.

*Common name.* Island Heath-myrtle.

*Notes.* After pressing, many specimens described as being prostrate on their labels appear to be more erect, but the presence of minute sand grains along their stems suggests that they were prostrate prior to pressing. As the fruits develop their diameter increases, the sepals also become wider (up to at least 2 mm), and the stamen groups become more widely separated.

**18. *Rinzia icosandra*** (F.Muell. ex Benth.) Rye, *comb. nov.*

*Baeckea crassifolia* var. (?) *icosandra* F.Muell. ex Benth., *Fl. Austral.* 3: 76–77 (1867). *Type:* limestone cliffs towards the Great Australian Bight, Western Australia, 1863, G. Maxwell s.n. (*syn.* K 000843226, MEL 72605 & 72606, PERTH 03344398).

*Illustrations.* Drawing by C.A. Gardner on *J.P. Brooks s.n.* (PERTH 03344266); W.E. Blackall & B.J. Grieve, *How Know W. Austral. Wildfl.* 3A: 81 (1980) [as *Baeckea crassifolia* var. *icosandra*].

*Shrub* (0.2–)0.3–1.3 m tall, up to at least 0.7 m wide, erect or spreading, single-stemmed or multi-branched at base; adventitious roots apparently absent; flowering branchlets with 1–4 pairs of flowers at or close to the end of the branchlet (sometimes apparently with 2 peduncles in an axil but these probably represent an extremely reduced lateral shoot with a single pair of axillary flowers). *Foliar collectors* present on young leaves. *Leaves* appressed or antrorse. *Petioles* 0.2–0.4 mm long. *Leaf blades* elliptic to narrowly oblong in outline, 1.5–3.5 mm long, 0.6–0.8 mm wide, 0.6–0.8 mm thick, usually obtuse, sometimes with a mucro up to 0.1(–0.15) mm long, entire or denticulate; adaxial surface flat or slightly convex; abaxial surface semi-elliptic, oil glands in 1 or 2 main rows on each side of midvein. *Bracteoles* usually caducous or deciduous, 1.5–2.5 mm long, less than half as wide as long, papery-scarious, entire. *Pedicels* 1.3–5 mm long. *Flowers* usually 6–9 mm diam. *Hypanthium* 1–1.5 mm long, c. 2–2.5 mm diam.; free part 0.5–0.8 mm long. *Sepals* triangular to depressed-ovate, 0.8–1.4 mm long, 1.2–1.7 mm wide, often somewhat keeled at base, red-brown to dark maroon, with a whitish margin 0.2–0.3 mm wide, denticulate or laciniate; auricles absent. *Petals* 1.5–3.5 mm long, pink or white. *Stamens* (11–)13–20, with 1–3 small, usually ± equidistant stamens in each gap between the large antipetalous stamens, the most common number 15, when 20 occurring both opposite and alternating with the sepals and petals. *Antipetalous filaments* 0.6–1 mm long, up to c. twice as long as the other filaments. *Anthers* 0.2–0.3 mm long. *Ovary* 1/2- to almost fully inferior. *Style* 1.4–1.8 mm long; stigma 0.1–0.2 mm diam. *Fruits* c. 2/3-superior at maturity, c. 1.8 mm long, c. 2.2 mm diam., up to 6-seeded. *Seeds* 1.2–1.5 mm long, 0.5–0.7 mm wide, 0.6–0.8 mm thick; testa golden-brown or brown; inner cavity often towards the base of the seed but sometimes more central, 0.7–0.9 mm long, longer than wide. (Figure 10)

*Diagnostic features.* Distinguished from other members of sect. *Semasperma* by the following combination of characters: bracteoles deciduous; pedicels 1.3–5 mm long; sepals red-brown to dark maroon; stamens usually more than 13, ± equidistant.

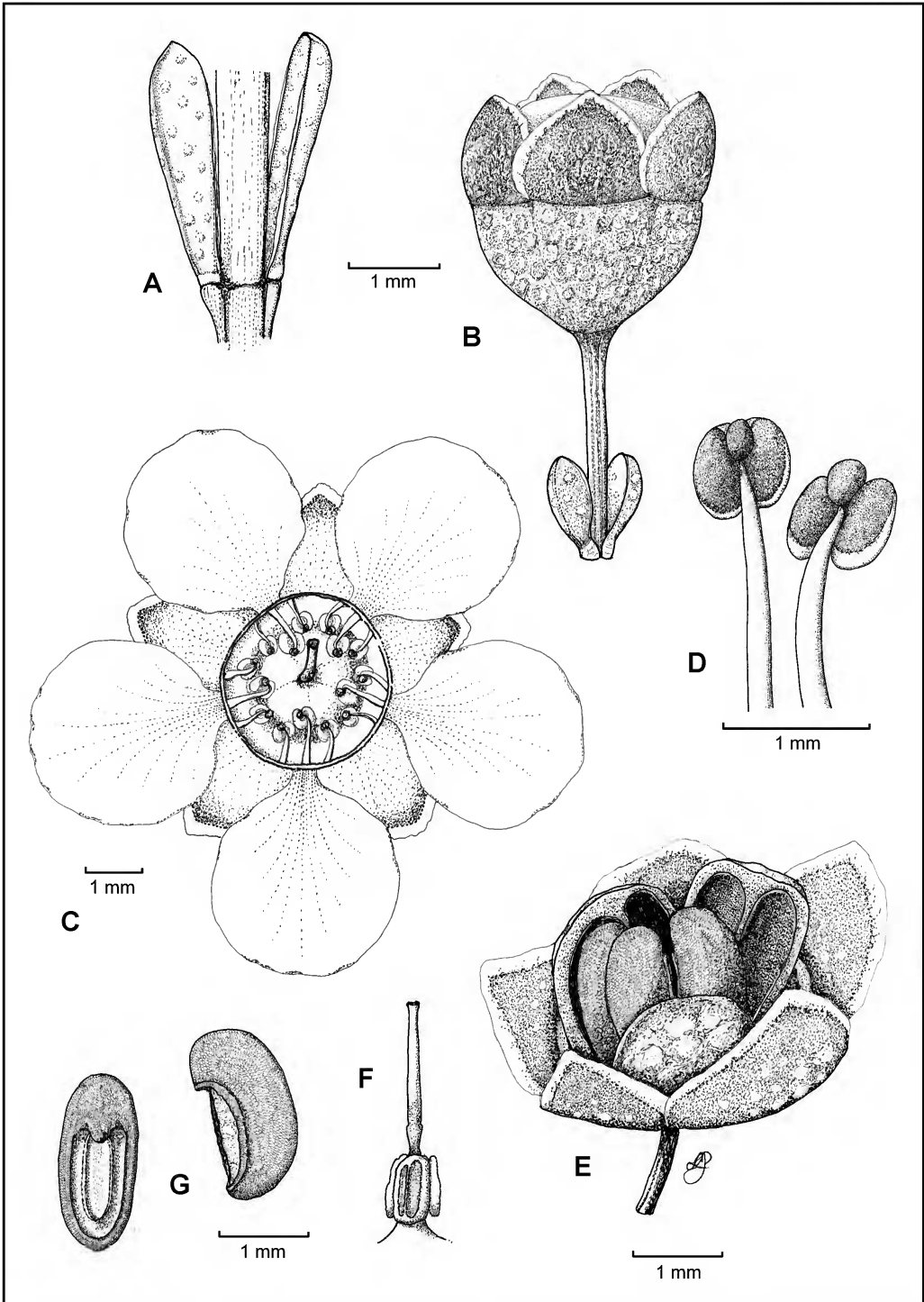


Figure 10. *Rinizia icosandra*. A – opposite leaves; B – minute peduncle, bracteoles, long pedicel and flower bud; C – flower; D – stamens; E – fruit; F – placentas and style; G – inner and side views of seed. Drawn by L. Cobb from *R. Bruhn* 10/14895 CAS (A–D) and *L. Cambell, T. Stone & Yoshi s.n.* (E–G).



*Selected specimens examined.* WESTERN AUSTRALIA: Israelite Bay, Sep. 1901, *J.P. Brooks s.n.* (PERTH); Cascade Rd, adjacent to locality 35, 28 Aug. 1995, *R. Bruhn* 10/14895 CAS (PERTH); SE corner of Reserve 24952, c. 300 m from highway, W of Scaddan, 7 Oct. 1998, *L. Cambell, T. Stone & Yoshi s.n.* (PERTH); W end of Great Australian Bight, 1877, *Carey s.n.* (MEL 73184); near Mt Ney, 9 Aug. 1980, *M.A. Clements* 1870 (CBG); Wittenoom Hills, 9 June 1972, *T.C. Daniell s.n.* (PERTH); 2.7 km S along Dempster Rd from junction of Lignite Rd, 65 km E of Scaddan, 22 June 2006, *R. Davis* 11034 (AD, PERTH); Mt Ragged on SW corner, 16 Sep. 1971, *N.G. Marchant* 71/499 (CANB, PERTH); 6 km W of Salmon Gums, 10 Mar. 1980, *K.R. Newbey* 6703 (PERTH); c. 3.5 km NE of intersection of Dalyup Rd and Loffler Rd, Scaddan, 21 Sep. 1998, *E.M. Sandiford* 114 (PERTH); extension of Howick Rd, 6.4 km NW of Coolinup Rd, 30 Aug. 2006, *M.E. Trudgen & B. Moyle* MET 22529 A (AD, BRI, CANB, K, MEL, PERTH); 17 km NE of Scaddan on Truslove Rd, 16 Aug. 1982, *P. van der Moezel* 111 (PERTH); S of Grasspatch, 1 Sep. 1917, *J.H. Willis s.n.* (MEL); 13.9 km NW along Kau Rock Rd from intersection with Coolinup Rd, 21 Oct. 1997, *Peter G. Wilson* 1418 & *N. Lam* (PERTH).

*Distribution and habitat.* Occurs in the south-east of the South West Botanical Province of Western Australia, extending from near Lort River east to near Israelite Bay, in sandy soils in mallee-dominated vegetation or shrublands, sometimes with *Cyathostemon*. This is the westernmost part of the distribution of *Rinzia* sect. *Semasperma* shown in Figure 3.

*Phenology.* Flowers have been recorded almost all year round, peaking between May and September, with mature fruits with seeds from August to October and in March.

*Conservation status.* This species is not considered to be under threat.

*Etymology.* From the Greek *icosandrus* (with 20 stamens), as this species has up to 20 stamens.

*Common name.* Recherche Mainland *Rinzia*. *Rinzia icosandra* occurs across the full longitudinal extent of the Archipelago of the Recherche, but on the mainland to the north of it rather than on the islands themselves.

*Small-flowered variant.* A small-flowered specimen (*J.P. Brooks s.n.* NSW, PERTH 03344266) with only 11 or 12 stamens is recorded from Israelite Bay. Drawings by C.A. Gardner on the PERTH specimen show half of a flower with six stamens, and the few flowers examined in this study had either 11 or 12 stamens. If these two specimens do come from Israelite Bay itself then they are more than 30 km west of all other known localities. A recent attempt to recollect the species in the Israelite Bay area was unsuccessful.

*Notes.* Mueller (1864) included this Western Australian taxon within *Baekkea crassifolia*, which he indicated as occurring at the western extreme of the Great Australian Bight as well as in south-eastern Australia. Bentham (1867: 77) was clearly unsure of its status and suggested it might be better treated as a form of *B. ericaea*, presumably because it was more similar to that species in its stamen number. The many morphological similarities between the three species now known as *R. ericaea*, *R. icosandra* and *R. orientalis* suggest that they are all closely related, but only the two eastern species group together in the molecular study of Lam *et al.* (2002).

*Rinzia icosandra* tends to be a larger plant than its two eastern relatives, with more papery bracteoles and longer pedicels. More subtle differences are its more obvious foliar colleters (these only visible on very young leaves of the eastern species) and its more closely pitted-rugose hypanthium. It may

also tend to have a more superior fruit and seeds with a longer (and more elongated) inner cavity that is more skewed towards the base than in the eastern species, but seeds with a more central cavity have also been observed in *R. icosandra*.

*Rinzia icosandra* is readily distinguished from *R. ericaea* by its pedicellate flowers, deciduous bracteoles, less distinctly ribbed sepals and usually by its more equidistant stamens. It can usually be readily distinguished from *R. orientalis* by its higher stamen numbers, but the Israelite Bay specimens have low stamen numbers, within the maximum part of the range of stamen numbers found in *R. orientalis*. *Rinzia orientalis* has very dark sepals contrasting in colour with the hypanthium in the dried state, whereas *R. icosandra* has somewhat paler sepals more similar in colour to the hypanthium after they have dried, often with a narrower pale margin and more diffuse protrusions of dark colouring into them, and a somewhat more thickened or prominently glandular centre-base. Generally, these characters are not as reliable as the characters listed above, separating *R. icosandra* from all of the eastern material. In any case, the large geographic separation of *R. icosandra* and *R. orientalis*, on opposite sides of the Great Australian Bight, means that they are unlikely ever to be confused.

There is considerable variation within *R. icosandra*. Apart from the small-flowered variant noted above, the lowest stamen number recorded for *R. icosandra* is 13 in two flowers from *E.M. Sandiford* 124, while 15 (as shown in Figure 10C) is the most common number. The maximum stamen number of 20 is rare, but was observed on one flower of an isotype (MEL 72606) that had been seen by Bentham. Despite choosing the epithet *icosandra*, Bentham (1867: 76) did note that there were often only two stamens between the antipetalous ones (rather than the three needed to make the total number of stamens in a flower 20).

Until they are shed, the scarious bracteoles fully enclose the young to late buds, and those shed at the latest stage or those on specimens with the longest pedicels are up to 2.5 mm long, such as on *K.R. Newbey* 6703. There are sometimes also much smaller bracts or bract-like structures at the base of the pedicels (e.g. reddish ones c. 0.5 mm long on *T.C. Daniell s.n.*, PERTH 03344290); these are much more persistent and herbaceous than the bracteoles.

One atypical specimen, *P. van der Moezel* 111, is unique in having broad, flat colleters up to 0.5 mm long, with up to 3 opposite each petal. It is also unusual in having some leaves more pointed than usual, with a mucro up to 0.15 mm long.

### 19. *Rinzia orientalis* Rye, *nom. nov.*

*Baeckea crassifolia* Lindl. in T.L. Mitchell, *Three Exped. Interior E. Austral.* 2: 114 (1838). *Baeckea crassifolia* Lindl. var. *crassifolia*. *Type*: interior of New Holland [probably lower Darling River near Burtundy, New South Wales], on Major Mitchell's expedition, [probably 2 June] 1836, *T.L. Mitchell* 194 (?*holo*: CGE *n.v.*, microfilm seen; ?*iso*: K 000843227, MEL 72576 lower left piece).

*Baeckea crassifolia* var. *pentamera* J.Black, *Trans. Proc. Roy. Soc. S. Austral.* 59: 259–260 (1935). *Type*: Kangaroo Island, South Australia, November 1934, *A.B. Cashmore s.n.* (*holo*: AD 97642077 specimen and notes on left side of sheet).

*Illustrations*. J.P. Jessop & H.R. Toelken (eds), *Fl. S. Austral.* (5<sup>th</sup> edn) 2: 894, Figure 462B (1986); N. Bonney & A. Miles, *What Seed is That?* p. 83 (1994); N.G. Walsh & T.J. Entwisle (eds), *Fl. Victoria* 3: 1037, Figure 214F (1996); G.J. Harden (ed.), *Fl. New South Wales* 2: 214 (2002); [all as *Baeckea crassifolia*]; drawing on *T.B. Cleland s.n.* (AD 96827028).

*Shrub* 0.2–0.75 m high, commonly erect, single-stemmed at the base; flowering branchlets with 1 or 2 pairs of flowers (or 1 or 2 solitary flowers) at or close to the end. *Foliar collectors* present on very young leaves but sometimes obscure. *Leaves* usually mostly widely antrorse. *Petioles* 0.2–0.3 mm long. *Leaf blades* elliptic to narrowly oblong in outline, 1.4–5(–6) mm long, 0.5–0.7 mm wide, 0.4–0.6 mm thick, obtuse, entire, the margin forming a slight rim or a narrow scarious projection; adaxial surface concave, flat or convex; abaxial surface rounded-convex or convex with flattened sides, with oil glands in 1 or 2 main rows on each side of midvein. *Bracteoles* caducous, 1–1.5 mm long, longer than wide, scarious, entire. *Pedicels* 0.8–1.5 mm long. *Flowers* 5–8 mm diam. *Hypanthium* 1.1–1.4 mm long, up to 3 mm diam.; free part 0.4–0.7 mm long. *Sepals* triangular to depressed-ovate, 0.8–1.3 mm long, 1.2–1.4 mm wide, very dark red with a whitish border 0.2–0.4 mm wide, acute or obtuse, entire or denticulate; auricles absent. *Petals* 2.2–3.1 mm long, white or pale pink. *Stamens* 5–10(–13), usually 10 opposite the sepals and petals, when 5 all antipetalous. *Antipetalous filaments* 0.7–1.1 mm long, tapering to apex. *Antisepalous filaments* (when present) 0.4–0.6 mm long. *Anthers* 0.3–0.35 mm long. *Ovary* largely or fully inferior. *Style* 0.8–2.2 mm long; stigma 0.1–0.2 mm diam. *Fruits* c. 1/2-inferior or largely superior, 1.7–1.8 mm long, 2–2.5 mm diam., 1(–4)-seeded. *Seeds* 1.3–1.6 mm long, 0.5–0.75 mm wide, 0.7–0.9 mm thick, brown; inner cavity usually central or slightly above the centre, 0.6–0.8 mm long, 0.5–0.7 mm wide.

*Diagnostic features.* Distinguished from other members of sect. *Semasperma* by the following combination of characters: bracteoles caducous; pedicels 0.8–1.5 mm long; stamens usually 5–10, antipetalous or opposite the sepals and petals.

*Selected typical specimens examined.* SOUTH AUSTRALIA: Ferries McDonald National Park, 22 Aug. 1973, *J. Carrick* 3389 (AD); Caralue Bluff, 27 km SW of Kimba, 19 May 1974, *M.D. Crisp* 810 (AD); Hundred of Makin, c. 23 km NE of Keith, 23 Aug. 1961, *N.N. Donner* 153 (AD); 4 mi. [6.5 km] N of Mt Hope Homestead, 22 Sep. 1965, *M.E. Phillips s.n.* (AD, CBG). NEW SOUTH WALES: Balranold, 20 July 1942, *R.V. Boynton s.n.* (NSW 122880); 4 km W of Kamarah, c. 50 km E of Griffith, 13 Nov. 1975, *M.D. Crisp* 1514 (CBG). VICTORIA: Wyperfeld National Park, SW corner of Western Sector near dozed track, 8 Oct. 1968, *A.C. Beauglehole* 29095b & *E.W. Finck* (MEL); Yanac Bushland Reserve, Wimmera study area, 9 Sep. 1986, *A.C. Beauglehole* 84017 (PERTH); Big Desert, Murrayville Track, c. 35 km SSE of Murrayville, 25 Aug. 1250, *N.G. Walsh* 1983 (PERTH).

*Selected long-leaved specimens examined.* SOUTH AUSTRALIA: Telowie Gorge, Flinders Range, 22 Aug. 1959, *R. Filson* 1391 (MEL); Eyre Hwy, near Lincoln turn-off, c. 50 km N of Whyalla, 2 Aug. 1969, *G. Gardiner s.n.* (AD); Kododa Hill, c. 17 km S of Yardea, 8 Aug. 1972, *A.G. Spooner* 2523 (AD); near summit of Mt Nott, Gawler Range, 9 km S of Thurlgee Stn, 1 Oct. 1972, *D.E. Symon* 8044 (ADW); rocky rises 6 km NW of Pine Lodge, Gawler Range, 19 km WSW of Yardea Stn, 10 Oct. 1972, *D.E. Symon* 8189 (ADW); Mt Dauble, Gawler Range, 4 Oct. 1972, *J.Z. Weber* 3366 (AD).

*Specimens with up to 13 stamens examined.* VICTORIA: SE of Red Cliffs, 200 yd [0.2 km] W of Stewart State School, 15 Aug. 1967, *J. Cullimore* 25 (MEL); NW Stewart, 1 Aug. 1967, *L. Henshall* 164 (NT).

*Selected rugose-leaved specimens examined.* SOUTH AUSTRALIA: Middle River, NW Kangaroo Island, Oct. 1905?, *E. Ashby s.n.* (NSW 122886); Stokes Bay, Kangaroo Island, 19 July 1933, *A.B. Cashmore s.n.* (AD); top of cliff, E of Cape Borda, Dec. 1968, *J.B. Kirkpatrick s.n.* (AD); Cape Borda, Kangaroo Island, 29 Aug. 1964, *M.E. Phillips* 418 (NT).

*Selected specimens of var. pentamera examined.* SOUTH AUSTRALIA: Hawk's Nest Stn, June 1932, *Anon. s.n.* (ADW 1737); near Kelly's Hill Caves, South Coast Rd, c. 15 km ENE of Cape du Couedic,

20 Sep. 1957, *J.B. Cleland s.n.* (AD); 5 mi. [8 km] from American River to Kingscote, 9 July 1964, *H.M. Cooper s.n.* (AD); South Coast Rd, near Mr Dave Schaeffer's property, 27 June 1963, *G. Jackson* 248 (AD); Mt Thisby Rd, 400 yd [0.4 km] E of Salt Lakes turnoff, 14 July 1963, *G. Jackson* 263 (AD); near Destrees Bay, Kangaroo Island, 30 Aug. 1964, *M.E. Phillips* 472 (BRI, CBG); Avery's Lagoon, c. 13 km SW of American River, 25 Sep. 1965, *M.E. Phillips s.n.* (CBG).

*Distribution and habitat.* Occurs in south-eastern Australia, extending from Eyre Peninsula and Kangaroo Island in South Australia east to the lower Darling and Murrumbidgee Rivers area of New South Wales and the Ballarat area of Victoria (Figure 9B). It is recorded mainly on dunes or sandplains with mallee scrub, in a fairly dry climatic zone.

*Rinzia ericaea* occurs entirely within the much wider distribution of *R. orientalis*, and occasionally the two species occur in close proximity, for example in Wyperfeld National Park, Victoria. Specimens collected there in early October differed in their phenology, with *R. orientalis* (*A.C. Beauglehole & E.W. Finck* 29095a) in fruit while *R. ericaea* (*A.C. Beauglehole & E.W. Finck* 29095b) was in bud and flower. Differences in flowering time may contribute to the reproductive isolation of these two taxa, but their overall flowering periods appear to be similar based on the collections examined. The October fruiting time may be atypical for *R. orientalis* as Bonney and Miles (1994) record January to March as the best period for harvesting its seeds.

*Phenology.* Flowers and fruits mostly recorded from August to November.

*Conservation status.* This is the most widespread and common species in the genus and it is not considered to be under threat.

*Etymology.* The oldest available epithet cannot be used when transferring this species to *Rinzia*, as it is predated by *R. crassifolia* Turcz. The new epithet reflects the fact that *R. orientalis* extends further east than any other member of the genus.

*Common name.* Desert Heath-myrtle. This species has also been known as Desert Baeckea, but that name is no longer appropriate now that the species is included in *Rinzia*.

*Typification.* For *B. crassifolia*, the collector and number are *T.L. Mitchell* 194 according to the CGE sheet presumed to be the holotype, whereas the K sheet has no collector's number and the MEL sheet gives the number as 164, but does not name the collector. As there were two collectors on the expedition, T.L. Mitchell and J.M. Richardson (Barker & Barker 1990), it is not certain that Mitchell was the sole collector of this material. Only the MEL sheet gives full details of the locality and date (given in square brackets above).

AD 97642077 has two specimens; the one on the left is labelled as the holotype of var. *pentamera* and is accompanied by notes and illustrations showing that it has only five stamens. The specimen on the right (*E.C. Black s.n.*) is from 83 miles [c. 135 km] north of Port Lincoln and is also accompanied by notes and illustrations indicating that there are only five stamens. As the latter specimen is the only five-staminate one examined in the current study that is reported to come from the mainland, its collection details need confirmation.

*Variation in vegetative characters.* Leaves vary considerably, much of the variation being related to the habitat occupied and seasonal effects. Specimens with the smallest leaves sometimes have them

almost elliptic in cross-section, with both the adaxial and abaxial surfaces convex. However, it is much more common for the abaxial surface to be much deeper than the adaxial one, which then tends to be flat or concave. Small-leaved specimens are common in all areas except for the northern part of the western third of the species' range; this area, from Gawler Ranges east to Flinders Range, has a long-leaved variant, including a specimen from south-west of Port Augusta (*G. Gardiner s.n.*, cited above) with leaves up to 6 mm long. Long-leaved specimens are also recorded through much of the remainder of the species' range, although they are less common than short-leaved specimens.

There is a concentration of specimens (some cited above) with markedly rugose leaves along the northern coast of Kangaroo Island. These specimens have more prominent oil glands than all or almost all of the mainland specimens. On the mainland, specimens with oil glands that are more prominent than usual, e.g. *J. Carrick* 3389, are scattered through the distribution.

Occasional oddities include a CBG specimen (*M.E. Phillips* 57) on which one branchlet has leaves in whorls of three rather than opposite-decussate.

*Variation in floral characters.* A variant on the south coast of Kangaroo Island, mainly in the area south of Kingscote (see Figure 9B), has most flowers with only five stamens; this has been named var. *pentamera*. Variation in stamen number on Kangaroo Island shows the full range from five to ten, but is almost completely constant at ten stamens on the mainland, the only notable deviation from ten being in two specimens, *J. Cullimore* 25 and *L. Henshall* 164, from near Red Cliffs in far north-west Victoria (see Figure 9B), that have 11–13 stamens in most flowers, with a spaced pair of short stamens opposite one to three of the sepals and with a single stamen directly opposite the remaining sepals.

Variety *pentamera* was described as having only five stamens (Black 1935), but most or all specimens of this variant have some flowers with higher numbers of six or more. This suggests that it is not worth retaining as a named variety, although it appears to be fully or largely geographically separated from specimens with uniformly ten stamens on the island.

Style length is very variable, ranging from 0.8 mm (e.g. *C.R. Alcock* 5955), or possibly down to 0.6 mm long, to at least 2.2 mm long at maturity.

*Notes.* Earlier descriptions of this taxon are given in Trudgen (1986b), Jeanes (1996) and Wilson (2002). Further study of the considerable variation in *R. orientalis* might reveal discontinuities that are worthy of recognition at some level. Four of its variants discussed above are either very geographically restricted, or have a definite area of concentration, within the overall range. For those variants specimens are cited above.

Other mainland variants seem to be more widely dispersed and need further study to determine whether they are associated with specific habitats or seasonal fluctuations etc.

In a number of morphological characters, *R. orientalis* shows a greater similarity to the Western Australian species *R. icosandra* than to the eastern species *R. ericaea*. This may be a result more of the odd morphological specialisations shown by *R. ericaea* than of actual genetic distance between the taxa, since both the chloroplast and nuclear molecular data (Lam *et al.* 2002; Peter Wilson pers. comm.) indicate a much greater affinity between the two eastern taxa than either has to the western species. The opportunity for physical contact between the eastern taxa might have allowed hybridisation and some degree of genetic exchange between them in the past.

*Rinzia orientalis* differs from both of the other species in its section in that its bracteoles are shed from the young buds and are smaller than in either of the other two taxa. See also the discussion of distinguishing features under *R. ericaea* and *R. icosandra*.

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### References

- Barker, R.M. & Barker, W.R. (1990). Botanical contributions overlooked: the role and recognition of collectors, horticulturalists, explorers and others in the early documentation of the Australian flora. In: Short, P.S. (ed.) *History of systematic botany in Australasia*. Pp. 37–85. (Australian Systematic Botany Society Inc.: South Yarra, Victoria.)
- Bean, A.R. (1995a). Reinstatement and revision of *Triplarina* Raf. (Myrtaceae). *Austrobaileya* 4: 353–367.
- Bean, A.R. (1995b). A new species and new combination in *Ochrosperma* Trudgen (Myrtaceae). *Austrobaileya* 4: 387–390.
- Bean, A.R. (1997). A new species of *Thryptomene* Endl. and a new species of *Ochrosperma* Trudgen (Myrtaceae). *Austrobaileya* 4: 647–651.
- Bentham, G. (1867). *Flora Australiensis*. Vol. 3. (Lovell Reeve & Co.: London.)
- Blackall, W.E. & Grieve, B.J. (1980). *How to know Western Australian wildflowers*. Part 3A. Revised 2<sup>nd</sup> edn by B.J. Grieve. (University of Western Australia Press: Nedlands, Western Australia.)
- Black, J.M. (1935). Additions to the flora of South Australia No. 35. *Transactions and Proceedings of the Royal Society of South Australia* 59: 252–262.
- Bonney, N. & Miles, A. (1994). *What seed is that?: a field guide to the identification, collection and germination of native seed in South Australia*. (Finsbury Press Pty Ltd.: Adelaide.)
- Erickson, R. (1969). *The Drummonds of Hawthornden*. (Lamb Peterson: Perth.)
- George, A.S. (2009). *Australian botanist's companion*. (Four Gables Press: Kardinya, Western Australia.)
- Jeanes, J.A. (1996). *Baeckea*. In: Walsh, N.G. & Entwisle, T.J. (eds) *Flora of Victoria*. Vol. 3. pp. 1034–1039. (Inkata Press: Melbourne.)
- Jones, A. (2015). *Threatened and Priority Flora list for Western Australia*. (Department of Parks and Wildlife: Kensington, Western Australia.)
- Lam, N., Wilson, Peter G., Heslewood, M.M. & Quinn, C.J. (2002). A phylogenetic analysis of the *Chamelaucium* alliance (Myrtaceae). *Australian Systematic Botany* 15: 535–543.
- Mitchell, T.L. (1838). *Three expeditions into the interior of eastern Australia, with descriptions of the recently explored region of Australia Felix, and of the present colony of New South Wales*. Vol. 2. (T. & W. Boone: London.)
- Moore, S. le M. (1920). A contribution to the flora of Australia. *Journal of the Linnean Society* 45: 159–220.
- Mueller, F. (1876). Myrtaceae. In: *Fragmenta phytographiae Australiae*. Vol. 10. pp. 22–31. (Government Printer: Melbourne.)
- Northern Territory Herbarium (2015–). *FloraNT Northern Territory Flora online*. Department of Land Resource Management. <http://eflora.nt.gov.au> [accessed 10 October 2016].
- Schauer, J.C. (1843). Genera Myrtacearum nova vel denuo recognita. *Linnaea* 17: 235–244.
- Schauer, J.C. (1844). Myrtaceae R.Br. In: Lehmann, C. (ed.) *Plantae Preissianae*. Vol. 1. pp. 98–158. (Meissneri: Hamburg.)
- Rye, B.L. (1987). Myrtaceae. In: Marchant, N.G., Wheeler, J.R., Rye, B.L., Bennett, E.M., Lander, N.S. & Macfarlane, T.D. *Flora of the Perth region*. Vol. 1. pp. 377–429. (Western Australian Herbarium: Perth.)

- Rye, B.L. (2009a). A reduced circumscription of *Balaustion* and description of the new genus *Cheyनिया* (Myrtaceae: Chamelaucieae). *Nuytsia* 19: 129–148.
- Rye, B.L. (2009b). An interim key to Western Australian tribes and genera of Myrtaceae. *Nuytsia* 19: 313–323.
- Rye, B.L. (2013). A revision of the south-western Australian genus *Astartea* (Myrtaceae: Chamelaucieae). *Nuytsia* 23: 189–269.
- Rye, B.L. & Trudgen, M.E. (2008). *Seorsus*, a new Gondwanan genus of Myrtaceae with a disjunct distribution in Borneo and Australia. *Nuytsia* 18: 235–257.
- Rye, B.L., Wilson, P.G. & Keighery, G.J. (2013). A revision of the species of *Hypocalymma* (Myrtaceae: Chamelaucieae) with smooth or colliculate seeds. *Nuytsia* 23: 283–312.
- Trudgen, M.E. (1986a). Reinstatement and revision of *Rinzia* Schauer (Myrtaceae, Leptospermeae, Baeckeinae). *Nuytsia* 5: 415–439.
- Trudgen, M.E. (1986b). *Baeckea* L. In: Jessop, J.P. & Toelken, H.R. (eds) *Flora of South Australia*. Part. 2. pp. 892–894. (South Australian Government: Adelaide.)
- Trudgen, M.E. (1987). *Ochrosperma* a new genus of Myrtaceae (Leptospermeae, Baeckeinae) from New South Wales and Queensland. *Nuytsia* 6: 9–17.
- Trudgen, M.E. (2001). Reinstatement and revision of *Euryomyrtus* (Myrtaceae). *Nuytsia* 13: 543–566.
- Trudgen, M.E. & Rye, B.L. (2005). *Astus*, a new Western Australian genus of Myrtaceae with heterocarpidic fruits. *Nuytsia* 15: 495–512.
- Trudgen, M.E. & Rye, B.L. (2010). *Enekbatus*, a new Western Australian genus of Myrtaceae tribe Chamelaucieae. *Nuytsia* 20: 229–260.
- Western Australian Herbarium (1998–). *FloraBase—the Western Australian Flora*. Department of Parks and Wildlife. <https://florabase.dpaw.wa.gov.au/> [accessed 10 October 2016].
- Wilson, P.G. (2002). *Baeckea*. In: Harden, G.J. (ed.) *Flora of New South Wales*. Revised edn. Vol 2. pp 211–214. (University of New South Wales Press: Sydney.)
- Wilson, P.G., Heslewood, M., Lam, N. & Quinn, C. (2004). Progress towards a phylogeny of the *Chamelaucium* alliance (Myrtaceae). *Australian Biologist* 17: 28–33.